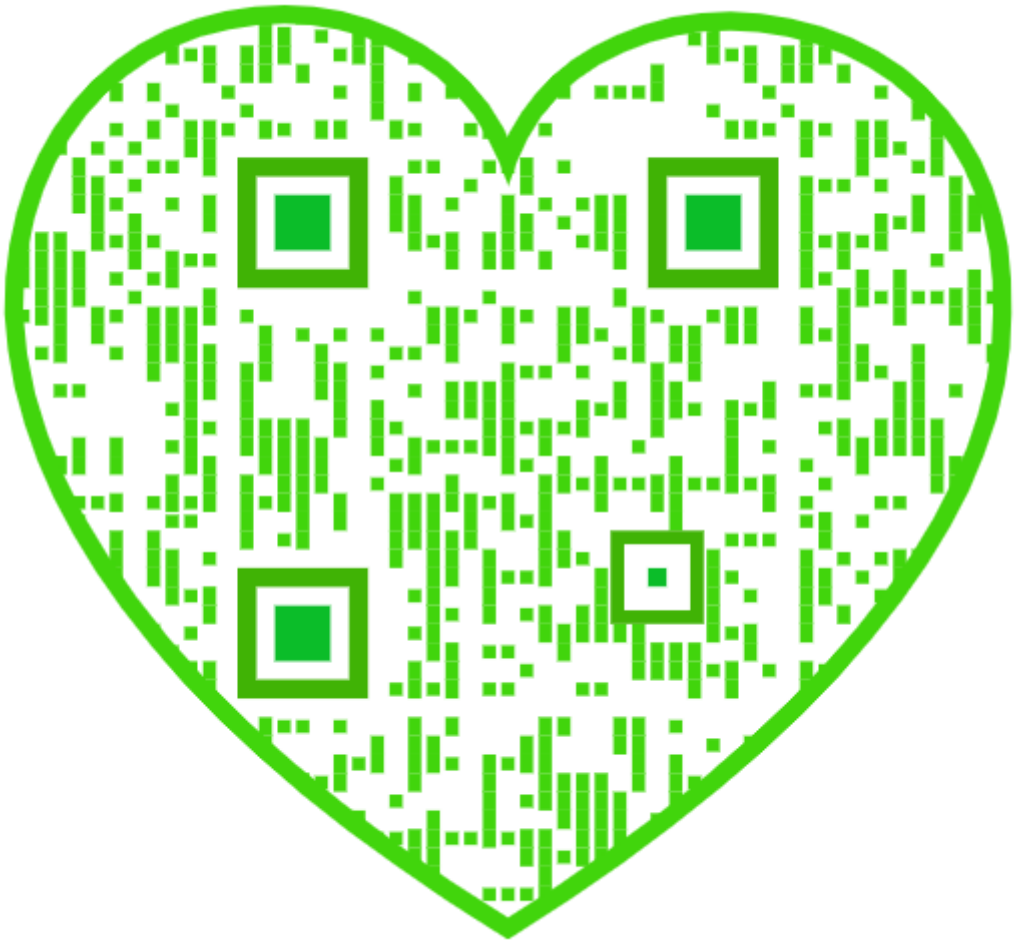

RATIONAL

ELEMENTARY ARITHMETIC

BY

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CHICAGO
SCOTT, FORESMAN AND COMPANY
1906

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ROBT. O. LAW CO., PRINTERS AND BINDERS, CHICAGO.

PREFACE.

GENERAL.

Many and substantial gains have been made in the last decade in both theory and practice in elementary education, and arithmetic has gained largely from this general advance. We have learned much of late as to practical ways of securing in the teaching of the elements of mathematical science the larger and the more significant educational aims—strengthening the judgment and the will, the power to think and to do.

The writer of an arithmetic who cuts himself off from these advances and satisfies himself with mere "figuring," or the mere meeting of an existing "consensus," cheapens his effort by denying the higher purposes of education and renounces his opportunity to help even the makers of programs by pointing the direction whence improvement must come. Without neglecting either of these two important requirements, the authors of this book have striven to make the arithmetic work more thoughtful, and even the drill purposeful and educative.

PLACE FOR FORMAL STUDY.

There is no school subject in which foreshortened views and distorted perspective work more harm than in elementary mathematics. Children as well as adults, learn new ideas by meeting them first in simple forms, intermingled with familiar ideas and *fairly well-understood uses* of the new ideas.

After a little, the new idea makes itself felt as something new. This is the time to differentiate it for formal study, to learn what it really is. This is the stage for the *study of process* and *for drill* enough to fix it and to make its use easy and facile.

The learner then desires to experience the added power the mastery of the process has given him, and this calls for the *application stage*. The treatment of new ideas, processes and topics in this book is accordingly arranged on this three-fold plan of (1) *its in-*

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formal use, (2) *its formal study*, and (3) *its application*. Examples of this plan may be seen in the teaching of the tables.

ORDER OF DEVELOPMENT.

The arrangement of number work for the grades must be in accordance with the natural unfolding of the child's mind. Too often this important fact is lost sight of in the logic of the subject itself. Strictly speaking there can be no contradiction between the demands of the child's mental development and the logical requirements of the subject. It is only when logic is construed to mean *the procedure of adult mind* that the demands of logic become mischievous in the elementary school. Rightly understood, logic means the natural procedure of the learning mind in mastering a subject. The recent work of experimental psychologists has proved conclusively that one law of human development is that what is best for the learner at a given stage of his development is also best for him ultimately. In the language of biological science, what is best for the tadpole while he is a tadpole is also best for him when he is a frog.

This doctrine, now generally accepted by all students of education, has done much toward the general accrediting of childhood at its true worth and has given flat and final denial of the right to quarrel with the child because he is not something else, by attempts of the teacher to force upon him the logic of the adult. This modern doctrine is also accepted by this book and it is believed it has unified the interests of logic with those of the child by making its logic the *logic of the learner* at the stage he has reached.

MOVEMENT AND UNITY.

Two things must be carefully provided for in an arithmetic for children. There must be continuous and progressive movement through the subject and there must be organic unity of parts. Too often sequence of processes and grading of exercises have wrought havoc with the essential integrity of arithmetic as a whole. The child looks through a narrow slit at the passing column, but fails to see the procession as a whole or even any important part of it. Divers attempts merely to make arithmetic easy, to make play of what must be work and work of what ought to be play, to tell number stories when there

is no story, which have gotten into recent texts, are open to the charge of having lost the unities of the subject in a confusion of irrelevant—not to say remote—associations.

Other writers, in the struggle for scientific unification and proportion of parts, have secured a sort of unity and balance at a great cost of practicability. The latter is a danger that leans toward "virtue's side," but the danger is real and serious and must be avoided. It is largely avoided by teaching nothing—not even a partial notion which is sometimes necessary—in such a way at one stage that it must be unlearned by the pupil at a later stage. How to secure both economic movement and essential unity has been the most earnest struggle of the authors of the RATIONAL ARITHMETICS. The task has not been easy and the teaching public will say how well they have succeeded.

MATERIAL. The ideas of number and of the numerical processes must be derived from the concrete. Form and number are the two main developments of quantity. The process of numbering in its varied aspects is very closely paralleled in the physical world by the process of measuring in its varied applications. This does not imply that numbering and measuring are one and the same process, or set of processes. What it does imply is that numbering is the mental side of the same problem of adjustment of activity that has its physical expression in measurement. It means that measurement is the most direct and certain route to correct notions of number, for one who has not yet acquired them.

That the theory of number has no necessary connection with measurement is witnessed by the fact that perfectly sound and adequate theories, constructed altogether on the basis of counting, are familiar to all students of advanced mathematics. The *continuum* of quantity can be constructed with perfect logical rigor out of the elementary number *discreta*. But this mode of evolution of the number system and processes is neither the more economical nor the more fruitful mode for the immature learner. The physical acts of the measuring processes run so closely parallel to the mental acts of the numbering processes, the one-to-one correspondence of steps in the

processes is so complete and so natural, that the child glides successively and with perfect ease and certainty into and through correct ideas of the unit, of the assemblage, of times, of parting and dividing, of fractioning, of ratio and proportion, and of valuation, to the idea of continuous positive and negative magnitude and number. The chief advantage to the child of making measurement fundamental to number is that motor, tactual, auditory, and visual sensations serve powerfully to re-enforce and to sharpen number impressions at every turn The whole being thus engages in the struggle for mastery of the difficulties of number and number process "The whole boy goes to school." Without abating energy on the symbolical phases and processes, this book seeks through joining, dividing, and measuring lines, surfaces, and solids, weights, etc., to fill symbols with meaning and processes with purpose.

The appeal to the concrete involves the use of certain materials, and any book based on this method of instruction must provide these within its pages. This the RATIONAL ELEMENTARY ARITHMETIC does in great variety; *e.g.*, lines, squares, and surfaces, cubes, and solids, pp. 1, 2, 4, 12, 20, 60, 100, 198, 204, etc., the construction of figures for linear and square measure on pp. 2, 4, 173, and 184, the visual presentation of fractions on pp. 158, 159, 161, 252, and 256. By means of these the child is also led to make use of other material which will aid him in grasping the principles involved. He learns to seize quantitative questions by the handle.

USE OF MATERIAL.

There are numerous lists of problems involving real measurement, and incidentally also counting at its best. These lists are carefully graded and the teacher is urgently recommended at all times to have pupils solve *all they can orally*. The pencil and paper should be used only when the difficulties of the problem make it too hard for the pupil orally. Different pupils will show very different degrees of aptitude for rapid oral work No plan of isolating the oral from the written work can suit the varying needs of different pupils, and every pupil has a right to the best sort of training of which he is capable. The problems of life are handled in this way and the pupil should early

form the habit of using his head as much as possible and his pencil only *as an aid to his head.*

CHOOSING PROCESS AND FORMING ESTIMATES. TESTING.

It is also recommended that teachers follow the practice of having pupils work rapidly through many of the lists of problems, indicating the processes called for and giving and recording estimates of about what the answers must be, *before any figuring is done.* Then the problems should be worked through and the correct results compared with the estimates. This work is of high value as training of judgment and as aiding the pupil to know *when*, as well as *how*, to add, subtract, multiply, or divide.

THE TABLES.

One of the gains that accrue from basing number teaching on measurement is that by associating parts of the multiplication table with certain facts of the denominate number tables, both sets of facts may be learned at once, and more easily than either may be learned alone. For example, the 2's may be based on the fact, 2 pt.=1 qt.; the 3's on 3 ft.=1 yd.; the 4's on 4 gi.=1 pt.; 4 pk.=1 bu.; 4 qt.=1 gal.; the 5's on 5c=1 nickel, 5 nickels=1 quarter, on the divisions of the clock-face, the number of school days in a week, etc. In this way the most common denominate number facts are learned and at the same time they furnish a concrete background and purpose for learning the multiplication table. The space idea is utilized in building the tables, so that the products of the multiplication tables are also seen to be mensuration facts. This incidental use of form is of no mean value. It is indeed one great reason why we need a multiplication table.

PROBLEMS.

The problems from beginning to end deal with realities, and appeal strongly to the child's environment and experience. This gives to the work a genuine interest which cannot otherwise be secured, and cultivates the powers of observation and of inference, and the ability to apply numbers to the situations of every-day life and experience, and at the same time strengthens the ability to see and make problems on one's own account from the raw materials of quantitative situations. Every new idea comes to the child in the form of a problem, and through the agency

of real problems he can be most easily made to feel the genuineness and usefulness of arithmetical knowledge. The RATIONAL ELEMENTARY ARITHMETIC works out the elementary ideas of arithmetic through the agency of real problems.

THE PLAN OF THE BOOK. PART I.

The work of the first 5 pages includes a review and summary of the 2's and 3's, which pupils will have learned before the third grade. Then follow the introduction of halves and fourths through a study and use of the foot-rule, then the teaching of the tables, beginning with the 4's, through the use of those standards of measure which call for the several factors to be taught and tabulated, and largely by aid of the mensurational facts involving these factors, see pp. 11, 12, 19, 20, 49, 50, etc. The tables are developed through the use of the 4, 5, 6, etc., as *multiplicand*, because this is the most natural way to *teach* them, but in the final form *for reference* the 4, 5, 6, etc., are put into the relation of *multiplier*. In consequence of the two-fold aspect of every number, the unit and the multiplicity (the times), the products are most easily built up and grasped by keeping the more difficult element, *the multiplicity*, as small as possible. One 6, two 6's, etc., are much easier than 6 ones, 6 twos, etc. Thus the 6's, for example, are first developed in the form

$$1\times 6 = 6$$
$$2\times 6 = 12$$
$$3\times 6 = 18$$
etc.

But these products are, speaking strictly, not the 6's at all, since the 6's are those products in which 6 enters *as a multiplier*. So that for final reference the table is written in the form of *The Sixes*, thus

$$6\times 1 = 6$$
$$6\times 2 = 12$$
$$6\times 3 = 18$$
etc.

(See p. 61)

The same system is followed in the rest of the tables, up to and including the 10's in Part I. Many uses of the 11's and 12's are given in Part I, but the final treatment and formulation of the 11's and 12's are reserved for Part II. Ample drills, short and frequent, are given to fix and make flexible the tabular facts taught.

PART II. Part II includes the final treatment of the 11's and 12's, easy scale-drawing, further use of denominate number tables, the teaching of the four fundamental operations, many unified lists of problems, promiscuous as to process but unified as to some central and interesting thought. See pp. 104, 105, 121, 132, 133, 146, 167, 168, etc., and considerable easy work calling for simple fractions. The demands of form are met through many useful problems in the mensuration of simple figures.

PART III. The last part of the book carries forward through the fifth grade the application of the fundamental processes to an extended range of practical problems calling often for more than one process, the development of the products by $12\frac{1}{2}$, 15, $16\frac{2}{3}$, and other factors of frequent occurrence in business and the industries; it includes the mensuration of boxes, scale-drawing, a fairly complete treatment of common and decimal fractions, denominate numbers, together with percentage and interest. These latter features will commend themselves to teachers who desire to do as much as possible for the boys and girls who are unable to go on with their school work beyond the fifth year.

DRILL. Exercises and problems for practice are to be found frequently throughout the book and they everywhere stand in organic relations to what precedes and follows. This book does not "teach by drill," but everywhere puts the drill feature in such relations to interesting and useful work as to make the drill both purposeful and interesting. Drill should always be for the purpose of fixing facts that have already been taught—and for the sake of establishing right habits of work. Even in the army the manual of arms and the manœuvres are first carefully taught and the drill is kept up to make correct procedure habitual and natural. Something like this is the correct mode in

number teaching. Judicious and intelligent drill constitutes an important feature of this book. The drill-master must live up to his reputation of being a *master of drill.*

FRACTIONS, PERCENTAGE, INTEREST. A fairly well-rounded elementary treatment of the essentials of common and decimal fractions, of percentage, and of interest is given at the close of Part III. The attempt has been to give only a fairly complete *first* view, rather than fullness and finality. As a means of recapitulating and bringing out more clearly the connections and meaning of the fundamentals than could be done in the earlier grades, this will be recognized at once as a feature no less valuable to the pupil who goes on to the more mature work of the grammar school, which builds on these fundamentals, than to the pupil who is forced to leave school at the end of the fifth year, and is very considerably benefited by a knowledge of these practical subjects.

The pleasant task now remains to the authors to make acknowledgment of their indebtedness to many superintendents, principals, and teachers who have assisted in perfecting the book by suggestions and corrections both in the manuscript and the proofs. To Mr. F. W. Buchholz, Professor of Mathematics in the Chicago Normal School, the authors are under especial obligations for the great pains and efficient service so kindly bestowed upon the proofs. His insight and broad experience as a mathematical teacher and supervisor have wrought wholesale improvement in the form, no less than in the substance of this book.

Chicago, Sept., 1905. THE AUTHORS.

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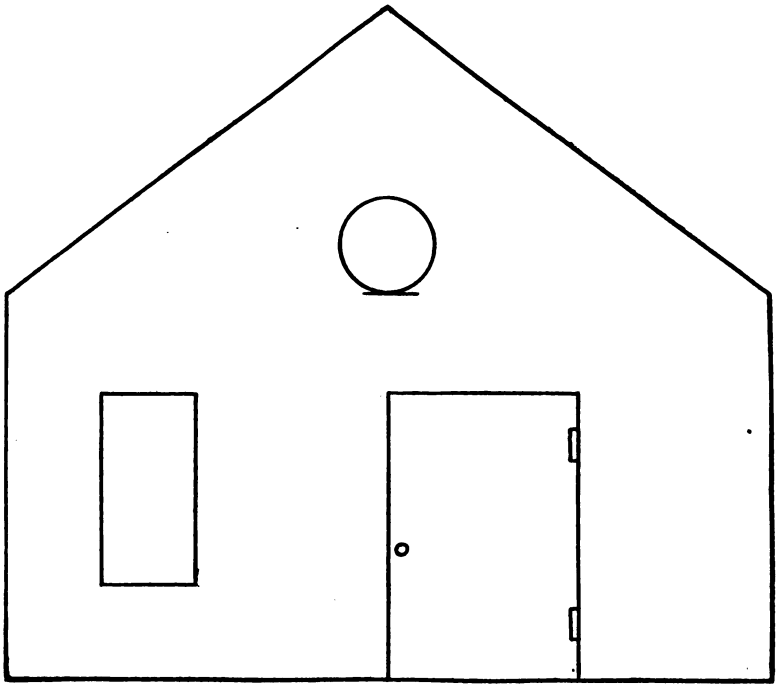
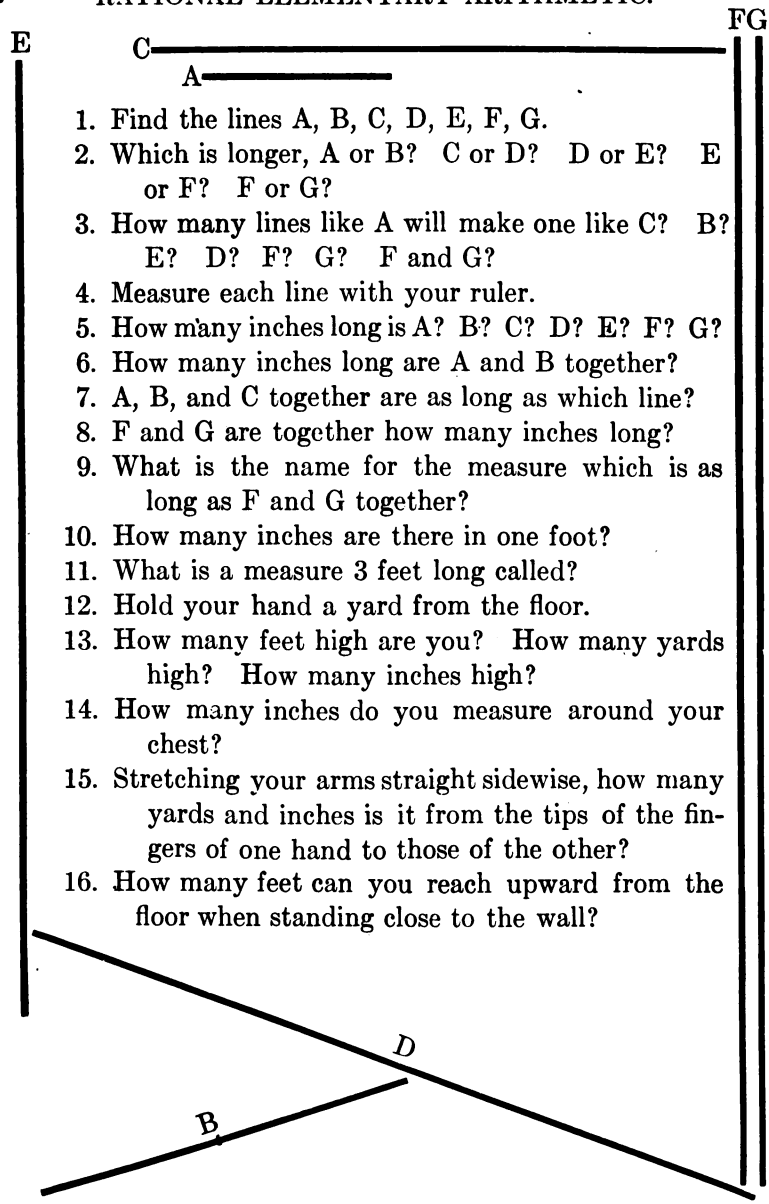
PART FIRST.



A boy made a cardboard house, one end the size of this drawing.

Without measuring write what you think are these distances:

1. The width. The greatest height. Length of the slant of the roof. Height to the lowest point of the slant.
2. Width and height of the lower window and of the door.
3. The distance between the right side of the house and the door; between the door and the lower window; between the lower window and the left side of the house; between the sill of the lower window and the floor.
4. Measure each of these distances with your ruler and compare them with what you thought they would be.



1. Find the lines A, B, C, D, E, F, G.
2. Which is longer, A or B? C or D? D or E? E or F? F or G?
3. How many lines like A will make one like C? B? E? D? F? G? F and G?
4. Measure each line with your ruler.
5. How many inches long is A? B? C? D? E? F? G?
6. How many inches long are A and B together?
7. A, B, and C together are as long as which line?
8. F and G are together how many inches long?
9. What is the name for the measure which is as long as F and G together?
10. How many inches are there in one foot?
11. What is a measure 3 feet long called?
12. Hold your hand a yard from the floor.
13. How many feet high are you? How many yards high? How many inches high?
14. How many inches do you measure around your chest?
15. Stretching your arms straight sidewise, how many yards and inches is it from the tips of the fingers of one hand to those of the other?
16. How many feet can you reach upward from the floor when standing close to the wall?

1. How many inches long is the front edge of your desk?
2. How many inches high is your desk?
3. How many feet high is a window sill in your schoolroom?
4. How many feet wide is the window?
5. Your schoolroom is how many feet long? How many yards long?
6. Your schoolroom is how many feet wide? How many yards wide?
7. How long, in feet, is one end of your schoolroom? How long are the two ends? How long is one side? How long are the two sides? How many feet are there around the walls of your schoolroom?
8. Measure a strip of the blackboard 3 yards long; 5 feet long; 15 inches long; 2 yards 1 foot long; 2 feet 10 inches long.
9. Step off or walk $5\frac{1}{2}$ yards.
10. How many inches in one foot? In 2 feet? In 3 feet?

TABLE

1 yard = ——— feet?
1 foot = ——— inches?

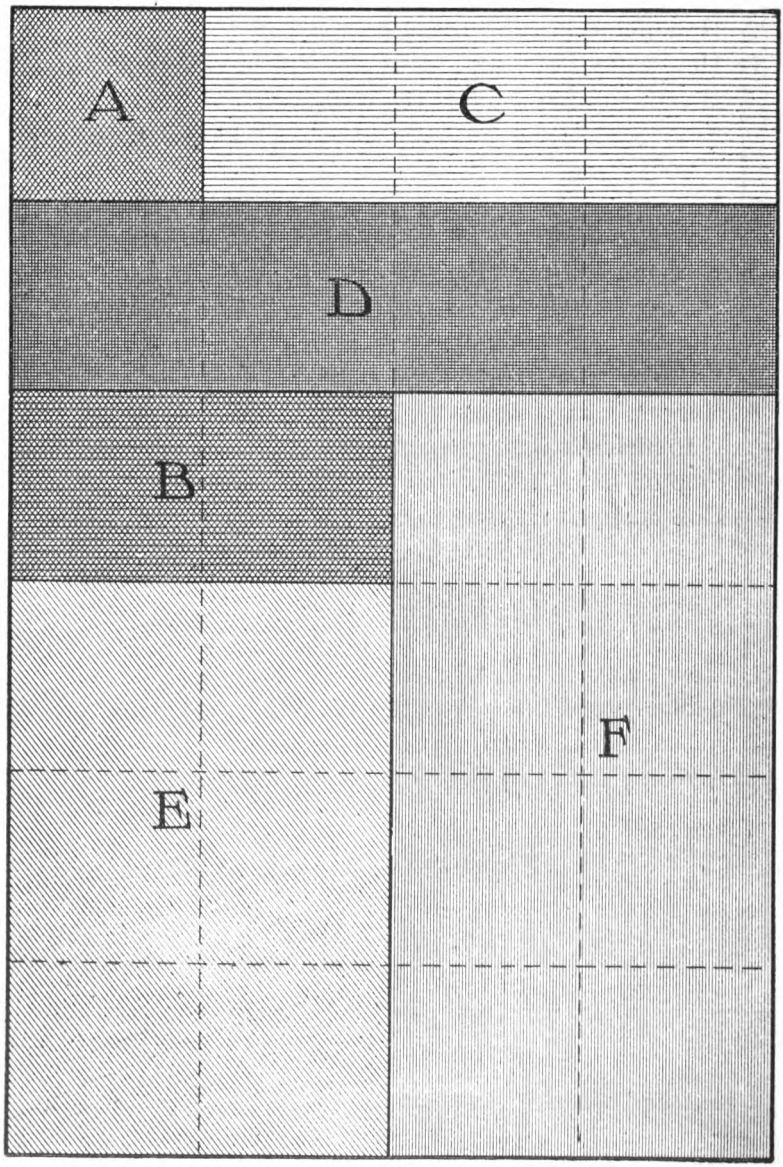
11. How many feet in 36 inches? In 24 inches?
12. A blackboard 6 feet long is how many yards long?
13. A box that is 2 yards long is how many feet long?
14. A room 12 feet wide is how many yards wide?

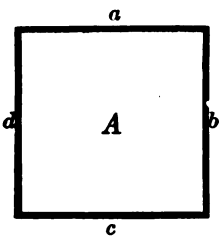
15. 3 and 2 are 5
or 2 added to 3 equals 5
3 plus 2 equals 5
3 + 2 = 5
} These all have the same meaning.

16. 3 + 4 = ? 6 + 2 = ? 4 + 2 = ? 6 + 1 = ? 5 + 2 = ?
8 + 1 = ? 3 + 5 = ? 5 + 4 = ? 7 + 2 = ? 4 + 3 = ?

17. Add:

6 pounds	8 dollars	6 feet	6 cents	7 yards	7 bushels
5 pounds	2 dollars	3 feet	4 cents	2 yards	5 bushels


A
C
D
B
F
E



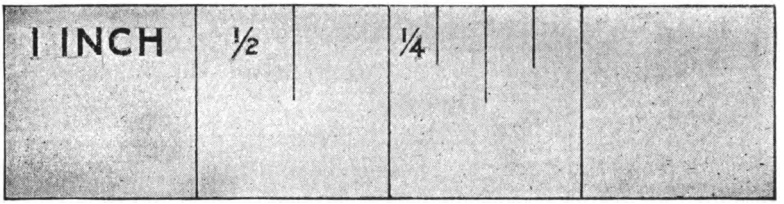
1. Draw the line *a* one inch long. Draw *b*, *c*, and *d* as in the figure *A*.
2. What kind of a figure have you made?
3. How long is *a*? *b*? *c*? *d*? How long, then, is each side of the square? Then what kind of a square may it be called?
4. How much space (surface) does *A* cover?
5. Find a surface (space) on page 4 which is equal to *A*.
6. On page 4, find a surface equal to two times *A*. What is it marked? How long is it? How wide? What kind of a figure is it? How many square inches are in it, or, what is its area? Draw an oblong the same size as *B*.
7. Draw an oblong as long as *A* and *B* (page 4) together.
8. How long is the oblong (rectangle) you have drawn? How wide? What is its area?
9. Find on page 4 a rectangle (oblong) the same size as the one you have just drawn.
10. On page 4, *A* and *C* together form a rectangle how long? How wide? What is its area?
11. Make a square equal to *A* and *C* together. What kind of a square is it called?

12. 2 twos equal 4
or 2 multiplied by 2 = 4
2 times 2 = 4
2 × 2 = 4
} These all have the same meaning.

Which is the shortest way to make this statement?

13.

2×3=?	2×7=?	2× 9=?	2×11=?	3× 9=?
3×2=?	3×3=?	3× 6=?	4×12=?	4× 9=?
3×4=?	4×4=?	4× 6=?	4×11=?	3×10=?
2×6=?	2×8=?	2×10=?	2×12=?	3×11=?
5×2=?	3×5=?	3× 7=?	3× 8=?	3×12=?
2×4=?	4×5=?	4× 7=?	4× 8=?	4× 1=?



1. How many inches are there in a foot?
2. Using the drawing on this page for a measure, cut a piece of stiff paper the same width and three times as long, for a rule.
3. Divide your rule into half inches. How many half inches will you have on your rule?
4. Divide it into quarter inches. How many quarter inches are there?
5. Draw a rectangle that is 5 inches long and contains 10 square inches. How wide is it?
6. Draw a rectangle that is 3 inches long and contains 9 square inches. How wide is it? What figure is it?
7. Multiply:

2	5	7	3	6	8	4	9	12	11	10
2	2	2	2	2	2	2	2	2	2	2

2	5	7	3	6	8	4	9	12	11	10
3	3	3	3	3	3	3	3	3	3	3

8. How many 2's in 4? In 2? 8? 6? 10? 12?
9. How many 3's in 6? In 12? 3? 9?
10. What is one-half of 4? Of 8? 2? 6? 10? 12? 14? 16? 18? 20?
11. What is one-third of 6? Of 12? 9? 15? 18? 21?
12. Count by 2's to 50; by 3's to 48.
13. Two is one-half of what number? One-fourth of what number? One-third of what number?

1. On page 2 which is the shortest line? The next in length? What is the difference between them?
2. C is how much longer than B? D than A? F than C?
3. F and G together are how much longer than D? Than E?
4. Draw a line twice as long as E. Name it H. Mark off a part of H equal to C on page 2. What is the length of the rest of H?
5. Draw a line 12 inches long. Mark off 3 inches. How many inches remain?
6. Draw a line 14 inches long. Mark off 6 inches. How much remains?
7. Find D on page 4. If a square equal to A were taken away, how many square inches would remain?
8. In square inches what is the difference between B and D? E and D? E and F? D and F?
9. What is the difference between F and the whole rectangle?
10. A 3-inch square contains how many more square inches than a 2-inch square?
11. A rectangle containing 12 square inches is how much greater than one containing 5 square inches?

6 less 2 = 4
or 2 subtracted from 6 = 4
6 minus 2 = 4
6 − 2 = 4

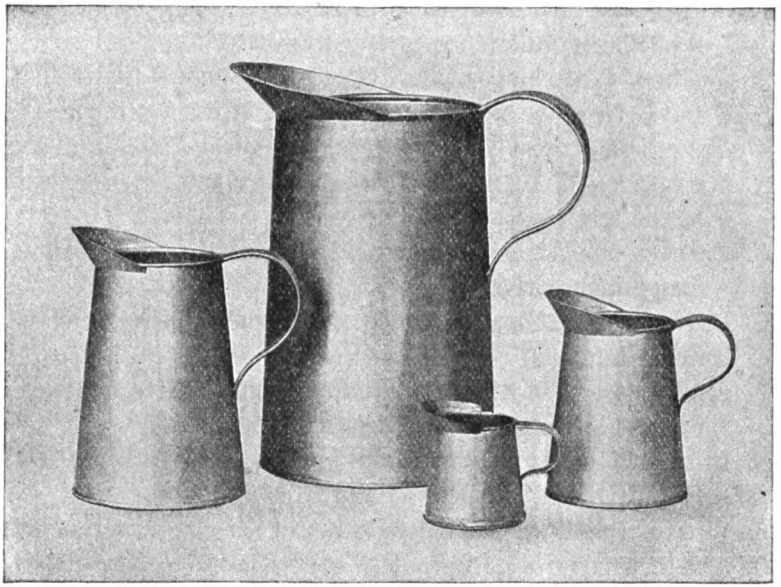
These all have the same meaning. Which is the shortest way to make this statement?

12. $8-4=?$ $7-2=?$ $10-3=?$ $8-5=?$ $9-5=?$
$11-5=?$ $10-8=?$ $12-7=?$ $9-7=?$ $8-6=?$

13. Subtract:

6	7	8	9	10	11	12	7	8	9
5	5	6	4	4	7	7	1	3	6

4	5	6	7	8	9	10	11	12	5
2	3	2	3	5	3	7	5	5	2

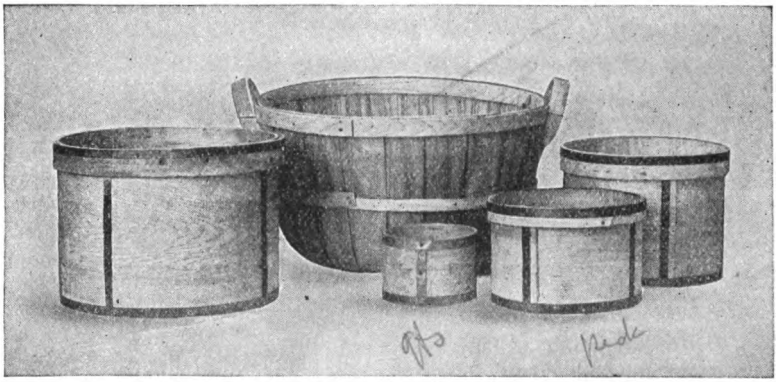


1. What is measured by the quart?
2. By measuring, find how many pints in a quart.
3. Two quarts equal how many pints?
4. One pint equals what part of a quart?
5. Measure and find how many gills in a pint.
6. Four pints equal how many quarts?
7. What is measured by the gallon?
8. Measure and find how many quarts in a gallon. How many pints are there in a gallon?
9. What part of a gallon is one quart? What part of a gallon are 2 quarts? 3 quarts?

	Quarts.	Pints.	Gills.
1 gallon =	——————?	——————?	——————?
1 quart =		——————?	——————?
1 pint =			——————?

Answer all you can orally.

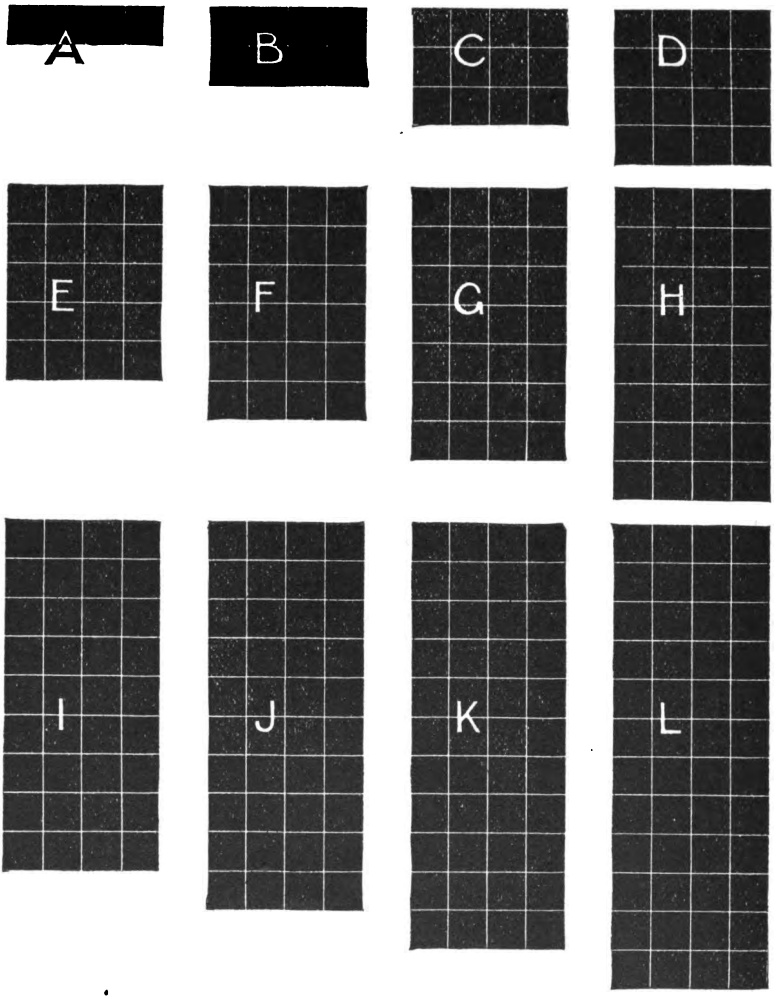
1. At 12 cents a quart, how much will a pint of oil cost?
2. How much will a gallon of milk cost at 6 cents a quart?
3. How much will a quart of cream cost at 4 cents a gill?
4. A can holds twelve quarts; how many gallons will it hold?
5. How many quarts does a three-gallon jug hold?
6. How many quarts of milk are there in sixteen pints? In twenty pints? In twenty-four pints?
7. A boy bought two gallons of mineral water, and sold four pints of it. How many pints had he left? How many gallons?
8. If a gallon of molasses costs 48 cents, what will a quart cost?
9. If a gallon of molasses costs 48 cents, what will 5 quarts cost?
10. At 48 cents a gallon, what will 1 pint of molasses cost? What will 3 pints cost?
11. Allen and Harold kept a lemonade stand at a picnic. At 20 cents a gallon, what did it cost them to make 2 gallons of lemonade?
12. They sold 8 half-pint glasses at 5 cents a glass. How many pints did they sell in this way? How much did they receive for them?
13. They sold 4 pint glasses at 8 cents a glass. How much did they receive for these?
14. They sold to 2 persons each 1 quart at 15 cents a quart. What part of a gallon did they sell in this way? How much did they receive for it?
15. At 20 cents a gallon, what would it cost them to make one quart of lemonade?
16. What was the gain on the first quantity sold? The second? The third?
17. How much did they have left?



1. What is sold by the bushel?
2. Find by measuring how many pecks there are in a bushel.
3. One peck equals what part of a bushel?
4. One-half of a bushel equals how many pecks? One-fourth of a bushel equals how many pecks? Three-fourths equal how many pecks?
5. How many pecks are there in one and one-half bushels?
6. Find by measuring how many quarts there are in one peck.
7. Put four quarts into the peck measure. Tell what part of the measure is filled.
8. Two quarts equal what part of a peck?
9. How many quarts are there in one and one-half pecks?
10. How many quarts fill a bushel measure?
11. One-eighth of a bushel is how many quarts?
12. One-fourth of a bushel is how many quarts?
13. Three-fourths of a bushel equals how many quarts?

	Pecks.	Quarts.	Pints.
1 bushel =	——?	——?	——?
1 peck =		——?	——?
1 quart =			——?

1. At 9 cents a quart, what will 4 quarts of strawberries cost?
2. A bushel of peaches contains how many pecks?
3. There are 2 pecks of shelled corn in a box and 8 quarts are taken out. How many quarts are left in the bin? How many pecks?
4. A man put in the bin a peck of oats at one time and a half bushel at another time. How many pecks were there then in the bin? How many quarts?
5. At 8 cents a quart, what will 4 quarts of cranberries cost?
6. If cherries cost 10 cents a quart, what will one-half of a peck cost?
7. A boy picked one and one-half bushels of cherries. He sold them by the peck; how many pecks did he sell? How many dollars did he receive for them at one-half dollar for a peck?
8. How many bags holding one bushel each would be required to hold twenty-four pecks of corn? How many holding two bushels each would be needed?
9. At 4 cents a quart what will a peck of beans cost? What will three-fourths of a peck cost?
10. If there are two bushels of wheat in a bin and seven pecks are taken out, how many pecks are left? How many quarts are left?
11. A man can dig five bushels of potatoes in one hour. How many bushels can he dig in two hours? How many pecks?
12. If oats cost 30 cents a bushel, what will two pecks cost?
13. A can holds sixteen quarts of berries. Ten pints of berries are taken out; how many pints are left?
14. At 1 dollar a bushel, what will 1 peck of apples cost?
15. If apples are bought at a dollar a bushel and sold at 30 cents a peck, what is the gain on one peck? On one bushel? On one and one-half bushels? On two pecks?



1. How many squares in A? How many rows of 4 squares each in B? In C? D? E? F? G? H? I? J? K? L?
2. A equals 4, B equals 8. What does C equal? D? E? F? G? H? I? J? K? L?

1 A equals what part of B? What part of C? Of D? E?

2. 4 is what part of 8? What part of 12? Of 16? 20? 24? 28? 32? 36? 40? 44? 48?

3. B equals how many A's? What part of D? of F? H? J?

4. 8 equals how many 4's? What part of 16? 24? 32? 40? 48?

5. C equals how many A's? What part of F? I? L?

6. 12 equals how many 4's? What part of 24? 36? 48?

7. D equals how many A's? How many B's? What part of H? L?

8. 16 equals how many 4's? How many 8's? What part of 32? 48?

9. E equals how many A's? What part of J?

10. 20 equals how many 4's? What part of 40?

11. F equals how many A's? B's? C's? What part of L?

12. 24 equals how many 4's? 8's? 12's? What part of 48?

13. G equals how many A's? 28 equals how many 4's?

14. H equals how many A's? How many B's? How many D's?

15. 32 equals how many 4's? How many 8's? How many 16's?

16. TABLE OF FOURS.

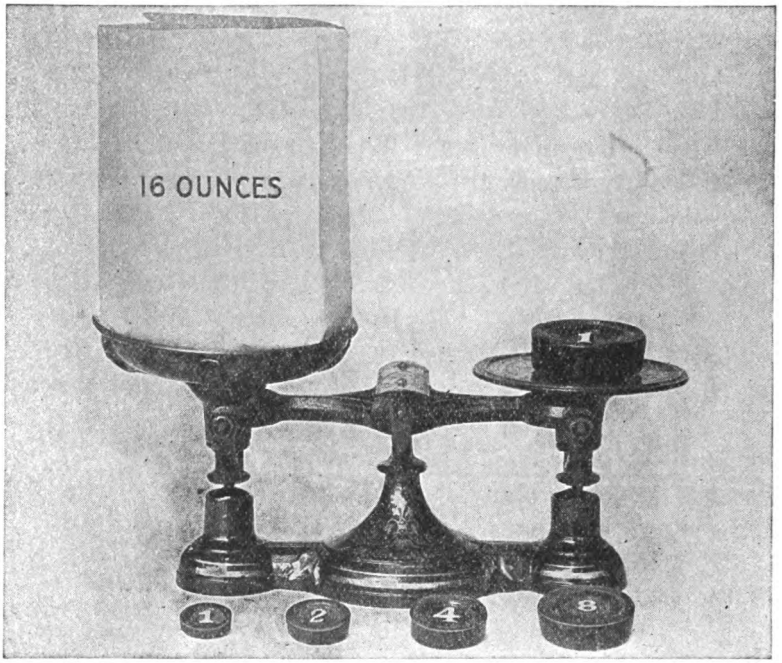
$4\times1=4$	$4\times4=16$	$4\times7=28$	$4\times10=40$
$4\times2=8$	$4\times5=20$	$4\times8=32$	$4\times11=44$
$4\times3=12$	$4\times6=24$	$4\times9=36$	$4\times12=48$

17. Multiply

7	10	11	8	2	4	3	5	6	1
4	4	4	4	4	4	4	4	4	4

18. 8 contains 4 two times
8 divided by 4 = 2
8 ÷ 4 = 2
} These all have the same meaning. Which is the shortest way to write this statement?

19. $12\div4=?$ $32\div4=?$ $28\div4=?$ $44\div4=?$ $20\div4=?$



1. What is sold by the pound?
2. One pound equals how many ounces?
3. How many ounces in half a pound? In a fourth of a pound? In $\frac{3}{4}$ of a pound?
4. The four-ounce weight equals what part of the pound?
5. The eight-ounce weight and the four-ounce weight together equal what part of the pound weight?
6. One and three-quarter pounds equal how many ounces?
7. Hold different objects in your hand and tell what you think the weight of each would be. Weigh each and compare its weight with what you thought it would be.

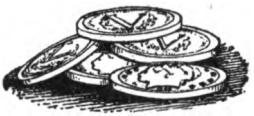
1 pound = —— ? ounces.
$\frac{1}{2}$ pound = —— ? ounces.
$\frac{1}{4}$ pound = —— ? ounces.

William and Mary went with a camping party and kept a small grocery store.

They bought for it the following articles:

4 pounds of sugar at 5 cents a pound.
12 pounds of white flour at 4 cents a pound.
10 pounds of Graham flour at 4 cents a pound.
1 pound of tea at 60 cents a pound.
1 pound of coffee at 40 cents a pound.
4 pounds of crackers at 9 cents a pound.
1 pound of cinnamon at 40 cents a pound.
1 pound of black pepper at 32 cents a pound.
12 bars of soap at 4 cents a bar.

1. How much did it cost them to buy all the sugar? The flour? The Graham flour? The crackers? The soap?
2. They sold the sugar in half-pound packages, charging 3 cents for each package. How much did they receive for all the sugar? How much did they gain on the sugar?
3. They sold the white flour in lots of 4 pounds each, at 5 cents a pound. How many lots of flour did they sell? How much did they receive for it? How much did they gain on it?
4. They sold the Graham flour at 4 cents a pound. How much did they receive for it? How much did they gain on it?
5 They sold the tea in quarter-pound packages at 20 cents a package. How much did they receive for it? How much did they gain on it?
6. The cinnamon was sold in 4-ounce packages, at 12 cents a package. How much was that for each ounce? How many packages were there? How much money was received for all the cinnamon? What was the gain on one pound?
7. The pepper was sold at 2 cents an ounce. Did they lose or gain on it and how much?



5 nickels

5 cents or 5¢

5 dimes

4 quarters

1 dollar or $1

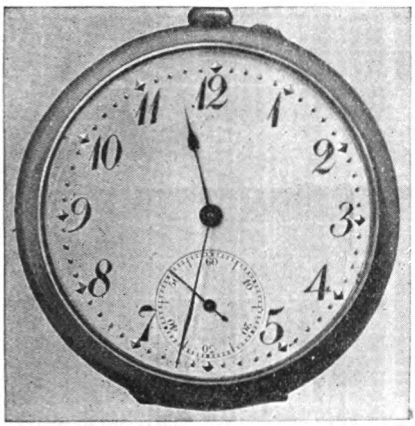
2 half-dollars

Answer all you can orally.

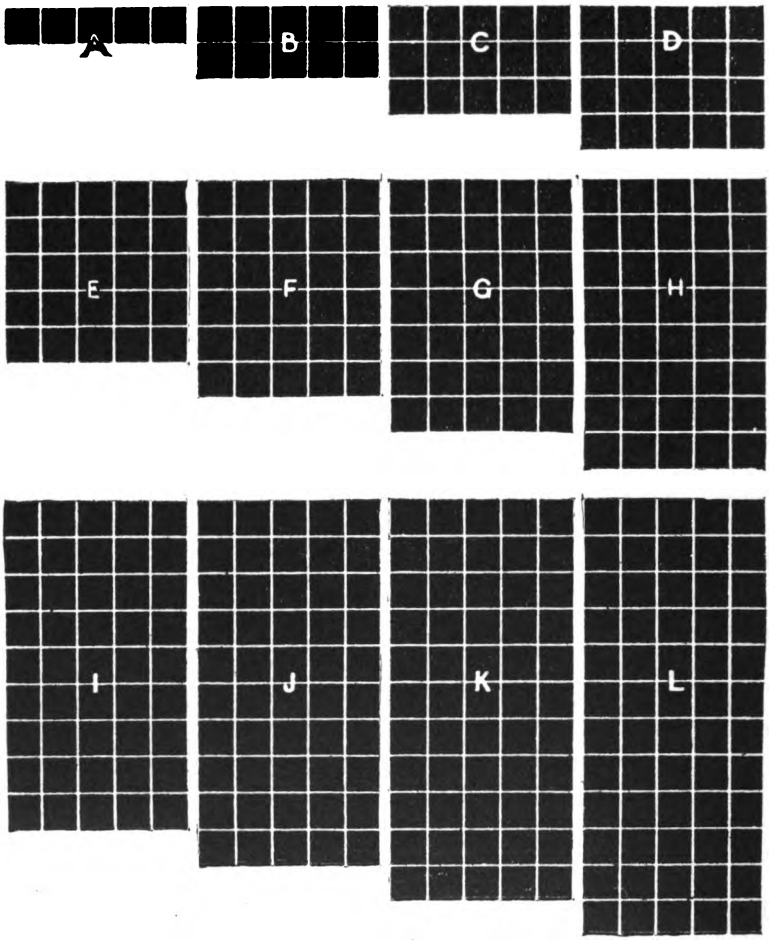
1. How many cents equal a nickel?
2. How many nickels equal a dime? How many cents equal a dime?
3. How many nickels equal a quarter? How many cents equal a quarter?
4. How many quarters equal a half-dollar? How many dimes equal a half-dollar? How many nickels equal a half-dollar?
5. Which would you rather have, one dollar or 2 half-dollars? One dollar or 4 quarters? One dollar or ten dimes?
6. What two pieces of money equal a dime?
7. What three pieces of money equal a quarter?
8. What two pieces of money equal seventy-five cents? What three pieces?
9. What two pieces of money equal a dollar? What three pieces? What four pieces?
10. To how many quarters are two dollars equal? Four dollars? Five and one-half dollars?
11. In the shorter way, write: 7 dollars; 9 dollars; 10 dollars; 12 dollars; 19 dollars; 20 dollars; 25 dollars; 5 dollars; 16 dollars; 1 dollar; 4 dollars.

1. A boy bought a top for 25 cents, and paid for it in nickels. How many nickels did he spend for it?
2. A book worth 30 cents is bought with a half-dollar. How many dimes are needed to make the correct change?
3. A package of flower seed costs 10 cents. How many quarters will pay for five packages? How many dimes?
4. How many 5-cent car fares can be paid with a quarter? With 15 cents?
5. Harry has 5 dimes in his bank; John has 1 quarter and 2 dimes in his. Which has the more money? How much?
6. At 10 cents each, how many balls can be bought for a quarter, a dime, and a nickel together?
7. A pound of candy costs 50 cents. How much can be bought for $1? For 25 cents? For 75 cents? For 10 cents?
8. How many 50-cent pieces will pay for a chair that costs $5? For one that costs $6?
9. A sled costs $1½. How many 25-cent pieces, or quarters, will be required to pay for it?
10. Joe bought a book for 30 cents, paper for 25 cents, and two pencils at 10 cents each. How much did he pay for all? What two pieces of money would pay for them? What four pieces?
11. If a gill of cream costs a nickel, how many dimes will pay for a quart?
12. If three dimes pay for a bushel of oats, how many nickels will pay for two pecks?
13. If one pound of seed costs a dollar, what part of a dollar will pay for four ounces?
14. If a box of blacking costs a dime, how many boxes can you buy for 60 cents?

1. Name the days of the week.
2. How many days are there in one week? In two weeks? In three weeks? In four weeks?
3. What part of the week is one day? Two days?
4. How many school days are there in one week? In three weeks? In five weeks?
5. How many days of the week are not school days?
6. How many days of the week are called working days?
7. How many more working days than school days in five weeks?
8. How many days are not working days in five weeks?
9. How many weeks are there in a month?
10. One week is what part of a month? Two weeks are what part? Three weeks are what part?
11. Name the months of the year, beginning with January.
12. How many months are there in the year?
13. What part of the year is one month? Three months? Six months?
14. The winter months are what part? The spring months? The summer months? The autumn months?
15. From 7 o'clock one morning to 7 the next morning is how many hours?
16. What is this number of hours called?
17. From one noon to the next noon is how many hours?
18. A girl walked from half past eleven until half past twelve. How many hours did she walk?
19. Alice stayed at her grandmother's from 10 o'clock Tuesday morning to 11 o'clock Wednesday morning. How many days was that? How many hours over?
20. If you have breakfast at 6 in the morning and dinner at 6 in the evening, how many hours between breakfast and dinner?
21. How many hours from a 7 o'clock breakfast to a luncheon at 1 in the afternoon?



1. Draw the face of a watch, and fasten to the center two movable hands.
2. Show how far the minute hand moves in an hour. Show how far the hour hand moves in an hour.
3. How many minutes are there in an hour?
4. How many minutes are there in half an hour? How many in one-fourth, or one-quarter, of an hour?
5. Show where the hands are at one o'clock.
6. Show where the hands are at thirty minutes after one, or half past one.
7. Show where the hands are at fifteen minutes after one, or quarter past one.
8. Move the hands to show the time of the opening of school in the morning; the beginning of recess; the closing of school at noon; the opening and closing of school in the afternoon.
9. If recess lasts fifteen minutes, what part of an hour does it last?
10. If a man works eight hours a day, what part of a day does he work?
11. George went to school eight months one year. What part of the year did he attend?
12. Stephen spent 3 months in Iowa, 3 months in Missouri, and 3 months in Arkansas. What part of a year did he spend in each state? In the 3 states?



1. How many squares in A?
2. A equals 5. How many 5's in B? How many in C? In D? E? F? G? H? I? J? K? L?
3. A equals 5, B equals 10. To what is C equal? D? E? F? G? H? I? J? K? L?

1. A equals what part of B? What part of C? Of D? E? F? G? H? I? J? K? L?
2. 5 equals what part of 10? What part of 15? Of 20? 25? 30? 35? 40? 45? 50? 55? 60?
3. B equals how many A's? What part of D? F? H? J? L?
4. 10 equals how many 5's? 10 is what part of 20? 30? 40? 50? 60?
5. C equals how many A's? C is what part of F? I? L?
6. 15 equals how many 5's? What part of 30? 45? 60?
7. D equals how many A's? How many B's? What part of H? L?
8. 20 equals how many 5's? How many 10's? What part of 40? 60?
9. E equals how many A's? What part of J?
10. 25 equals how many 5's? What part of 50?
11. F equals how many A's? How many B's? How many C's? What part of L?
12. 30 equals how many 5's? How many 10's? What part of 60?
13. G equals how many A's?
14. How many D's equal H?
15. A and B together are what part of F?

TABLE OF FIVES.

5×1= 5	5×4=20	5×7=35	5×10=50
5×2=10	5×5=25	5×8=40	5×11=55
5×3=15	5×6=30	5×9=45	5×12=60

16. Multiply:

3	5	6	8	1	2	7	9	4	10	12	11
5	5	5	5	5	5	5	5	5	5	5	5

17. What is one-fifth of 5? Of 15? 10? 20? 25? 40?
18. Divide each of the following numbers by 5: 10; 20; 30; 40; 50; 60; 5; 15; 25; 35; 45; 55.

1. A train leaves one station at ten minutes after twelve, and arrives at the next at half past twelve; how many minutes does it take to go from one station to the other? What part of an hour?
2. A man closes his store and starts for home at six o'clock. He walks home in a quarter of an hour. What time is it when he arrives?
3. A man begins work at eight o'clock, and stops at half past five. How many hours a day does he work if he stops an hour at noon?
4. Mary is six years old and Jennie is six and three-fourths years old. How many months older is Jennie than Mary?
5. School begins at nine o'clock and closes at half past three. How many hours are there between the opening and the closing? An hour and a half are allowed at noon, and half an hour for recesses; how many hours are the pupils in school during one day?
6. A farmer owned eighteen horses. He sold six; how many had he left? What part of 18 had he left?
7. A man mailed nine letters at one time and six at another. How many did he mail altogether?
8. From a bunch of eighteen bananas, nine bananas were sold. How many remained on the bunch?
9. There were twenty sheep in one pen, and ten in another. How many in both? If five were taken out of each pen, how many remained in the pens?
10. A boy paid a dime for a bat, and a nickel for a ball. How many cents did he pay for both?
11. A play began at 2 in the afternoon and lasted until 15 minutes after 5. How many hours and what part of an hour was that?
12. A concert two hours long was how many minutes long?

1. How long a string will reach around the frame of a slate that is eight inches long and five inches wide?
2. A box five inches high is twice as wide as it is high. How wide is it? Its length equals the sum of its width and height. How long is it?
3. By cleaning walks, Edwin earned a quarter on Monday, a dime on Tuesday, and a nickel on Wednesday. How much did he earn in the three days?
4. One jar holds five pints, another holds seven pints. How many pints do both hold? How many quarts?
5. A ship leaves one port at noon on Monday and arrives at her next port at noon on Saturday. How many days was she on the way?
6. In a class of twenty pupils there were five more girls than there were boys. How many girls were there in the class? How many boys?
7. A car goes five miles an hour. How many hours will it take to go ten miles? Twenty miles? Fifteen miles? Twenty-five miles?
8. Fifteen acres of land are divided into three equal fields. How many acres are there in each field?
9. When it is a quarter past nine o'clock, how many minutes past nine is it?
10. How many pints of oil are there in a can holding fifteen quarts?
11. A table is four feet long and three feet wide. A leaf one foot long and as wide as the table can be put in. How many square feet does the table then contain?
12. A piece of sidewalk seven feet long contains thirty-five square feet. How wide is it?
13. Henry bought 10 newspapers for 15 cents and sold them at 3 cents each. How much money did he gain? At 1 cent each, how many papers could he buy with it?

1. If a peck of beans costs 40 cents, what will one quart cost?
2. How many four-quart pails can be filled from seventeen quarts of milk? How many quarts will be left?
3. A man started for town at ten minutes to nine, and arrived at twenty minutes after nine. How many minutes was he on the way? What part of an hour was he on the way?
4. A garden six yards long is one-half as wide as it is long. How many yards of fence are needed to inclose it?
5. A grocer bought one tub of butter containing ten pounds, and another containing five pounds. How many pounds did he buy? How many jars holding five pounds each could he fill with the butter?
6. How many dollars are equal to three five-dollar bills? Four five-dollar bills? Five ten-dollar bills?
7. When 16 cents is paid for twelve eggs, how many cents must be paid for six eggs?
8. There are twenty days of school in a month. Louis was absent five days. What part of the school month was he absent?
9. How many pairs of shoes at $2 a pair can be bought for $15? How much money will be left?
10. The rent of one house is $30 a month; the rent of another is one-half as much. What is the rent of the second house? Of both houses?
11. A signboard contains thirty-six square feet. If the signboard is six feet high, how wide is it? If it is nine feet wide, how high is it?
12. An automobile made a trip at the rate of a mile in 3 minutes. The trip was made in an hour. How many miles were covered? How far did it run in 1 minute?

1. From a jug holding one gallon of syrup, one quart and one pint are taken. How much syrup is left in the jug?
2. How many bags holding six pecks each will be required to hold six bushels of corn?
3. A train leaves one station at fifteen minutes after one and arrives at the next station half an hour later. At what time does it reach the second station?
4. What is the weight of three packages, two of which weigh ten ounces each, and one, five ounces?
5. A rectangular lot containing sixty square yards, is twelve yards long. How wide is it?
6. If one pound of coffee costs 32 cents, what will four ounces cost?
7. A boy left home at eight o'clock in the morning and returned at noon. How many hours was he away? What part of the day was he away?
8. If a rope was cut into four equal parts, and each part was three feet long, what was the length of the entire rope?
9. In a basket of fruit there are two dozen pears. If half a dozen are taken out, how many will be left?
10. The glass in a picture frame is two feet wide and three feet long. How many square feet are there in its surface?
11. A clock is fifteen minutes fast. What is the correct time when the clock says half past three?
12. With what three pieces of money can five 3-cent car fares be paid?
13. If one peck of potatoes costs 25 cents, what will three pecks cost? Four pecks?
14. There were 12 pages in each chapter and 2 chapters in each part of a book having 2 parts. How many pages were in the book? How many pages were in each part?

Exercises on Twos and Threes

Read each line across the page throughout the table. Then read each column from the top downward.

2×4 or $4\times2=?$	$\frac{1}{2}$ of 8 or $8\div2=?$	$\frac{1}{4}$ of 8 or $8\div4=?$
2×3 or $3\times2=?$	$\frac{1}{2}$ of 6 or $6\div2=?$	$\frac{1}{3}$ of 6 or $6\div3=?$
$2\times2=?$	$\frac{1}{2}$ of 4 or $4\div2=?$	.....
2×5 or $5\times2=?$	$\frac{1}{2}$ of 10 or $10\div2=?$	$\frac{1}{5}$ of 10 or $10\div5=?$
2×8 or $8\times2=?$	$\frac{1}{2}$ of 16 or $16\div2=?$	$\frac{1}{8}$ of 16 or $16\div8=?$
2×6 or $6\times2=?$	$\frac{1}{2}$ of 12 or $12\div2=?$	$\frac{1}{6}$ of 12 or $12\div6=?$
2×9 or $9\times2=?$	$\frac{1}{2}$ of 18 or $18\div2=?$	$\frac{1}{9}$ of 18 or $18\div9=?$
2×7 or $7\times2=?$	$\frac{1}{2}$ of 14 or $14\div2=?$	$\frac{1}{7}$ of 14 or $14\div7=?$
2×11 or $11\times2=?$	$\frac{1}{2}$ of 22 or $22\div2=?$	$\frac{1}{11}$ of 22 or $22\div11=?$
2×10 or $10\times2=?$	$\frac{1}{2}$ of 20 or $20\div2=?$	$\frac{1}{10}$ of 20 or $20\div10=?$
2×12 or $12\times2=?$	$\frac{1}{2}$ of 24 or $24\div2=?$	$\frac{1}{12}$ of 24 or $24\div12=?$
2×1 or $1\times2=?$	$\frac{1}{2}$ of 2 or $2\div2=?$	.....
3×2 or $2\times3=?$	$\frac{1}{3}$ of 6 or $6\div3=?$	$\frac{1}{2}$ of 6 or $6\div2=?$
3×4 or $4\times3=?$	$\frac{1}{3}$ of 12 or $12\div3=?$	$\frac{1}{4}$ of 12 or $12\div4=?$
3×6 or $6\times3=?$	$\frac{1}{3}$ of 18 or $18\div3=?$	$\frac{1}{6}$ of 18 or $18\div6=?$
3×8 or $8\times3=?$	$\frac{1}{3}$ of 24 or $24\div3=?$	$\frac{1}{8}$ of 24 or $24\div8=?$
3×10 or $10\times3=?$	$\frac{1}{3}$ of 30 or $30\div3=?$	$\frac{1}{10}$ of 30 or $30\div10=?$
3×12 or $12\times3=?$	$\frac{1}{3}$ of 36 or $36\div3=?$	$\frac{1}{12}$ of 36 or $36\div12=?$
$3\times3=?$	$\frac{1}{3}$ of 9 or $9\div3=?$	.....
3×5 or $5\times3=?$	$\frac{1}{3}$ of 15 or $15\div3=?$	$\frac{1}{5}$ of 15 or $15\div5=?$
3×7 or $7\times3=?$	$\frac{1}{3}$ of 21 or $21\div3=?$	$\frac{1}{7}$ of 21 or $21\div7=?$
3×9 or $9\times3=?$	$\frac{1}{3}$ of 27 or $27\div3=?$	$\frac{1}{9}$ of 27 or $27\div9=?$
3×11 or $11\times3=?$	$\frac{1}{3}$ of 33 or $33\div3=?$	$\frac{1}{11}$ of 33 or $33\div11=?$
3×1 or $1\times3=?$	$\frac{1}{3}$ of 3 or $3\div3=?$	.....

Exercises on Fours and Fives

Read each line across the page throughout the table. Then read each column from the top downward.

4×3 or $3\times4=?$	$\frac{1}{4}$ of 12 or $12\div4=?$	$\frac{1}{3}$ of 12 or $12\div3=?$
4×9 or $9\times4=?$	$\frac{1}{4}$ of 36 or $36\div4=?$	$\frac{1}{9}$ of 36 or $36\div9=?$
4×5 or $5\times4=?$	$\frac{1}{4}$ of 20 or $20\div4=?$	$\frac{1}{5}$ of 20 or $20\div5=?$
$4\times4=?$	$\frac{1}{4}$ of 16 or $16\div4=?$	.....
4×2 or $2\times4=?$	$\frac{1}{4}$ of 8 or $8\div4=?$	$\frac{1}{2}$ of 8 or $8\div2=?$
4×6 or $6\times4=?$	$\frac{1}{4}$ of 24 or $24\div4=?$	$\frac{1}{6}$ of 24 or $24\div6=?$
4×8 or $8\times4=?$	$\frac{1}{4}$ of 32 or $32\div4=?$	$\frac{1}{8}$ of 32 or $32\div8=?$
4×12 or $12\times4=?$	$\frac{1}{4}$ of 48 or $48\div4=?$	$\frac{1}{12}$ of 48 or $48\div12=?$
4×7 or $7\times4=?$	$\frac{1}{4}$ of 28 or $28\div4=?$	$\frac{1}{7}$ of 28 or $28\div7=?$
4×11 or $11\times4=?$	$\frac{1}{4}$ of 44 or $44\div4=?$	$\frac{1}{11}$ of 44 or $44\div11=?$
4×10 or $10\times4=?$	$\frac{1}{4}$ of 40 or $40\div4=?$	$\frac{1}{10}$ of 40 or $40\div10=?$
4×1 or $1\times4=?$	$\frac{1}{4}$ of 4 or $4\div4=?$	.....
5×6 or $6\times5=?$	$\frac{1}{5}$ of 30 or $30\div5=?$	$\frac{1}{6}$ of 30 or $30\div6=?$
5×10 or $10\times5=?$	$\frac{1}{5}$ of 50 or $50\div5=?$	$\frac{1}{10}$ of 50 or $50\div10=?$
5×7 or $7\times5=?$	$\frac{1}{5}$ of 35 or $35\div5=?$	$\frac{1}{7}$ of 35 or $35\div7=?$
5×11 or $11\times5=?$	$\frac{1}{5}$ of 55 or $55\div5=?$	$\frac{1}{11}$ of 55 or $55\div11=?$
5×2 or $2\times5=?$	$\frac{1}{5}$ of 10 or $10\div5=?$	$\frac{1}{2}$ of 10 or $10\div2=?$
5×12 or $12\times5=?$	$\frac{1}{5}$ of 60 or $60\div5=?$	$\frac{1}{12}$ of 60 or $60\div12=?$
5×8 or $8\times5=?$	$\frac{1}{5}$ of 40 or $40\div5=?$	$\frac{1}{8}$ of 40 or $40\div8=?$
5×3 or $3\times5=?$	$\frac{1}{5}$ of 15 or $15\div5=?$	$\frac{1}{3}$ of 15 or $15\div3=?$
$5\times5=?$	$\frac{1}{5}$ of 25 or $25\div5=?$	.....
5×4 or $4\times5=?$	$\frac{1}{5}$ of 20 or $20\div5=?$	$\frac{1}{4}$ of 20 or $20\div4=?$
5×9 or $9\times5=?$	$\frac{1}{5}$ of 45 or $45\div5=?$	$\frac{1}{9}$ of 45 or $45\div9=?$
5×1 or $1\times5=?$	$\frac{1}{5}$ of 5 or $5\div5=?$	.....

1. 25 A tablet cost 25 cents and a reader fifty cents. Find
   50 the cost of both.
   How many dimes and cents in 75 cents?
2. 25 I sold a peck of apples for 25 cents and a cake for
   23 23 cents. How much did I receive for them?
   How many dimes and cents in 48 cents?
3. 26 What is the cost of a dozen eggs at 26 cents and one
   3 pound of flour at 3 cents?
   How many dimes and how many cents in 29 cents?
4. 6 What must I pay for a tablet at 6 cents and a pencil
   5 at 5 cents?
   Eleven cents equals how many dimes and how many cents?
5. 26 What is the cost of a pound of butter at 26 cents
   15 and a peck of apples at 15 cents?
   Twenty-six cents equals how many dimes and how many cents? 15 cents equals how many dimes and how many cents? 26 cents + 15 cents?

6. 26 = how many tens and how many ones?
   15 = how many tens and how many ones?
   26 + 15 = how many tens plus how many ones?

7. Write in figures and add:

1 ten + 1 = ?	1 ten + 6 = ?	1 ten + 8 = ?
1 ten + 9 = ?	1 ten + 7 = ?	1 ten + 3 = ?

8. Read the following numbers as ones, and as tens + ones: 21, 32, 44, 56, 27, 49, 45, 64, 73, 75, 78, 87, 89, and 91.

9. Add:

16 inches	18 cents	13 pounds	16 bushels	20 gallons			
12 inches	11 cents	14 pounds	13 bushels	16 gallons			
20	22	21	56	58	51	64	67
13	11	18	42	31	27	54	91

1. John's bowstring was 19 inches long and William's was 2 inches longer than John's. How long was William's bowstring?
2. Mary sewed a seam 13 inches long and Kate sewed a seam 18 inches longer than the one Mary sewed. How long was Kate's seam?
3. Adam made a bench 18 inches long for the porch, and George made a bench 29 inches long. How long were the two benches together?
4. Add:

18	14	18	16	17	16	18	19	15	13	19
13	17	15	18	17	17	14	19	19	17	12

5. How many 10's are there in the answer in each problem just given? How many 10's are there in the 10's column of the numbers to be added? Why are there 3 tens in the answers and only 2 tens in the 10's columns?
6. Add:

14	18	17	16	13	14	15	12	16	18	14
17	16	17	17	19	14	19	18	16	11	17
15	14	15	12	15	17	15	19	16	15	11

7. In each case in problem 6, how many 10's are there in the answer? Why are there four 10's in the answer and only three 10's in the 10's column of the numbers to be added?
8. Add:

12	14	16	12	18	14	15	14	18	17	17
13	15	18	17	19	15	18	17	18	16	17
19	17	19	19	16	18	19	19	18	19	17

9. In each case in problem 8, read the answer as ones and as tens and ones.

1. A lady paid 47 cents for some velvet, 15 cents for straw-braid, and 34 cents for lace. How much did she pay for all?
2. There are three mother hens in a barnyard and each has a brood of little chickens. One has 15, another 14, and the third 13. How many little chickens are there altogether?
3. What is the cost of a pound of butter at 28 cents, a dozen eggs at 16 cents, and a dozen oranges at 35 cents?
4. What is the cost of a box of writing-paper at 35 cents, a story book at 47 cents and a paper knife at 29 cents?
5. Add from the bottom and from the top:

24	26	27	28	29	29	45	77
13	39	29	38	38	59	15	19
25	17	28	48	27	19	59	19
—	—	—	—	—	—	—	—
84	32	76	82	7	96	24	25
19	17	19	9	29	9	59	38
9	58	19	19	79	8	18	49
—	—	—	—	—	—	—	—

6. James earned $46; Herman earned $29 and Adam earned $18. How many dollars did the three together earn?
7. On the first shelf of a bookcase were 58 books, on the second shelf 27 books and on the third shelf 26 books. How many books were on the three shelves?
8. In a jeweler's window there were 3 cases of rings. In the first case there were 27, in the second 59, and in the third 18. How many rings were in the three cases?
9. Charlie rode on his wheel 24 miles one day, 22 the second day, and 25 the third. How far did he ride in all?
10. Alice rode her pony 38 miles one week, 36 another week, and 34 another. How far did she ride in all?

1. A boy had 289 stamps. He bought 195 more and his father gave him 48. How many stamps had he then?

   What is the sum of the ones?

   289
   195
   48

   How many tens does it contain? (Write the ones.)

   To what column must the tens be added?

   What is the sum of *all* the tens?

   How many hundreds does it contain? (Write the tens.)

   What is the sum of all the hundreds? (Write it.)

2. A miller sold 247 barrels of flour to one man, 256 to another, and 323 to another. How many barrels of flour did he sell to all?
3. A newsboy sold 209 papers on Monday, 187 on Tuesday, 193 on Wednesday, 197 on Thursday, 178 on Friday, and 227 on Saturday. How many did he sell during the week?
4. Add both upward and downward:

143	354	145	252	178	627	147	397
342	435	514	145	296	192	296	256
235	143	152	243	342	184	499	719

5. A farmer owned 144 sheep, 279 horses, and 298 cows. How many head of stock did he own?
6. An automobile made a run of 178 miles one day, 164 miles the next day, and 159 miles the third day. How many miles were made in the three days?
7. On three different days a store made sales amounting to these sums: $175, $186, and $197. What was the sum of the sales of these three days?
8. Find the entire weight of 4 boxes of freight, weighing: 199 pounds, 134 pounds, 152 pounds, and 181 pounds.

1. A farmer kept fifteen sheep in one field, twenty-four in another, thirty-one in another, and forty-three in another. How many sheep did he have in all the fields?
2. George earned $53 in the winter, $43 in the spring, $25 in the summer, and $34 in the fall. How many dollars did he earn in the whole year?
3. A girl paid 35 cents for a book, 15 cents for paper, 3 cents for a ruler, and 23 cents for a box of paints. How much did she pay for all?
4. A man traveled one hundred thirty-five miles the first week, two hundred fifty-four miles the second week, and five hundred forty-one miles the third week. How far did he travel in the three weeks?
5. I paid $135 for a horse, $154 for a carriage, and $23 for harness. How much did the horse and carriage cost? How much did they all cost me?
6. How long a line will it take to go around a house that is thirty-six feet long and twenty-eight feet wide?
7. George borrowed $31 from his father and paid back $16. If he saved $3 a week, how many weeks would it take him to save enough to pay the rest of the debt?
8. Arthur earns $12 in one month and William $10. If their father earns as much as both of them, how much does he earn? How much do the three earn?
9. Mr. Stone bought a lot for $354, filled it in at a cost of $125, and built a fence around it at a cost of $70. What did the whole cost?
10. In going a journey a man drove 29 miles west, 30 miles north, 46 miles west again, and 28 miles north. How long was the journey?
11. The repairs on an automobile cost $14 at one time, $25 at another, $27 at another time, and $52 at another. How much money was paid for repairs?

1. A boy borrowed \$78 from his father and paid back \$54. How much did he still owe?
2. Clara read 42 pages of her book containing 96 pages. How many pages remained to be read?
3. A girl saved 68 cents (from her allowance of one dollar) and spent 32 cents. How much more did she save than she spent?
4. From 78 gallons 89 pounds 97 feet 67 dollars
   take 43 " 35 " 63 " 43 "

5. From 43 54 67 89 354 597 728
   take 11 21 34 45 142 423 415

6. From 22 24 28 25 32 43
   take 16 18 19 17 26 38

7. John had 92 cents and gave 38 cents to Albert. How much had he left?

   92 cents
   38 cents
   54 cents

   92 cents equals how many dimes and how many cents?
   Can you take eight cents from two cents?
   If one dime is changed into cents, can you then take 38 cents from 92 cents?
8. John had 92 marbles and gave away 38 marbles. How many had he left?
9. From 31 65 42 72 40 53 47 61
   take 17 48 24 57 27 27 18 19

10. From 71 94 81 91 84 62 73 82
    take 13 45 54 45 25 33 15 56

11. From a spool of thread containing 50 yards, 27 yards were used. How many yards were left?

1. Read each number in the following problems, first as dimes and cents, then as tens and ones.

From	75	64	83	96	82	97	88	60
take	37	29	48	77	55	49	29	31

2. Subtract:

41	32	84	71	35	94	43	87	98
19	14	69	38	16	67	29	58	79

3. Grace bought 37 marbles and gave 19 of them to Madge. How many had she left?
4. Marion read 25 pages of her book, which had in it 41 pages. How many pages had she yet to read?
5. Elizabeth had 72 cents, 48 of which she earned. The rest was given to her. How much was given to her?
6. Ethel made 64 fudges and ate 27 of them. How many were left?
7. John earned 27 cents toward paying for a clock which will cost 65 cents. How much had he yet to earn?
8. Alice bought 20 ounces of lemon candy and gave away 13 one-ounce packages. How many ounces had she left?
9. Paul planted 58 tomato plants and all but 19 came up. How many came up?
10. Subtract:

88	76	87	75	86	74	85	73	84	72
29	37	49	37	58	39	46	48	59	34
68	91	82	73	64	95	86	77	67	90
59	59	49	39	58	69	69	48	59	75

11. $27 - 18 = ?$ $35 - 29 = ?$ $48 - 29 = ?$ $34 - 18 = ?$
$37 - 19 = ?$ $42 - 14 = ?$ $75 - 69 = ?$ $96 - 58 = ?$

1. 48 pounds of flour were taken from a barrel holding 192 pounds. How many pounds remained?

   From 192 pounds
   take 48 "

   Add the answer and the lower number (48 pounds). To what other number is this sum equal?

2. John had $6.22 and he gave $2.55 to Henry. How much had he left?

   $6.22
   2.55
   $3.67

   Can you take 5¢ from 2¢? What, then, must you do?

   How many dimes are left in the dimes' place in the upper number?

   Can you take 5 dimes from one dime? What, then, must you do?

   What remains in the dollars' place of the upper number?

3. Mr. White had 622 books and he sold 255 of them. How many had he left?

4.

From	311	722	416	328	632	345
take	123	499	298	199	594	156

5. A man earned $222 and spent $198 for a horse. How much money had he left?
6. A farmer sold a lot for $360, which was $171 more than it cost. What was the cost of the lot?
7. It requires 280 feet of molding for the second story and 192 feet for the third story. How much more is required for the second than for the third story?
8. Clara's purse contains $3.63. If she spends $2.76 for books, how much money will there be left?
9. A farmer having 262 sheep, sold 178. How many had he left? Test.
10. James was flying his kite with 300 feet of string. The string broke, leaving 234 feet in his hands. How many feet of string went with the kite? Test.

1. Mr. White bought a horse for $175 and sold him for $210. How much did he gain?
2. It cost Mr. Black $135 to put a new roof on his stable. He paid all but $39 of this sum. How much did he pay?
3. A druggist bought 250 boxes of soap. He sold 168 boxes. How many were left unsold?
4. A man traveled 176 miles of a journey of 360 miles. How far had he then to travel?
5. A woman owed $275 for a piano. After paying $187, how much did she still owe?
6. Subtract:

280	311	702	863	524	605	237	800
178	126	345	679	235	517	148	716
790	800	310	671	822	443	924	295
637	518	129	218	213	159	647	167
818	507	686	400	825	727	690	800
729	318	428	217	636	419	528	311

7. John earned $525 a year and his expenses were $347. How much did he save?
8. A fire was lighted in an old grate and 310 chimney swallows fell down, blinded by the smoke. When they were taken to the air 128 of them were able to fly away, but the rest died. How many died?
9. From a crib containing 213 bushels of corn 136 bushels were used. How many bushels were left in the crib?
10. Four hundred fifteen copies of a first reader were bought by a book store, but only three hundred forty-six copies were sold. How many were still on hand?

1. What is the cost of 2 dozen eggs at 23 cents a dozen?

Add	Multiply	
23	23	2 times 3 cents = ?
23	by 2	2 times 2 dimes = ?
46	46	

2. Find the cost of 3 pounds of butter at 22 cents a pound.
3. James has 21 marbles. Henry has 4 times as many. How many has Henry?
4. Multiply:

34	23	44	32	31	42	62	73
2	3	2	4	5	3	4	2

5. How much will 3 yards of cloth cost at 58 cents a yard?

Add	Multiply	
58	58	3 times 8 cents equals how many
58	by 3	dimes and how many cents?
58		3 times 5 dimes equals how many dimes?

What is the sum of all the dimes?
3 times 58 cents = ?

6. How many pounds of flour in 3 sacks of 58 pounds each?
7. If one-fourth of a barrel of flour weighs 49 pounds, what does a whole barrel weigh?
8. Multiply:

36	28	57	38	76	41	45	79
2	3	2	4	3	5	4	2

9. How many ounces in 3 pounds? 4 pounds?
10. At 36 cents a peck, what is the cost of a bushel of apples?
11. How many feet of fence will it take to inclose a square lot, one of whose sides is 125 feet long?
12. Four wire ropes, each 243 feet long, are used to hold a large chimney in place. How many feet of rope are used in all?

1. A gardener set out four rows of trees, putting eighty-two trees in each row. How many trees did he set out?
2. If a person pays $4 a week for board, how much will he pay in a year, or fifty-two weeks?
3. There are twenty-four sheets of paper in a quire. How many sheets are there in five quires?
4. How many bushels of wheat are there in ninety-six bags, if each bag contains two bushels?
5. What will three pianos cost at $285 each?
6. A family uses thirty-eight quarts of milk in a month. How much will the milk bill amount to for a month at 5 cents a quart?
7. Multiply:

325	438	147	235	268	470	138	167	295
3	2	5	4	3	2	5	4	2

179	489	249	304	169	230	294	157	109
3	2	4	3	5	4	3	5	4

8. There are one hundred ninety-six pounds of flour in a barrel. How many pounds in four barrels?
9. Mr. Gates sold his horse for $87. I sold mine for three times as much. How much did I receive for my horse?
10. If Mr. Field pays $36 for one month's rent, what will his rent be for five months?
11. One hundred ninety-six loaves of bread can be made from a barrel of flour. How many loaves can be made from five barrels of flour?
12. Dr. Allen pays $75 a year for his telephone. What will it cost him for four years?
13. At 5 cents each, what will 2 dozen crayon pencils cost? What will 28 such pencils cost?
14. How many school days in 14 weeks?

1. Mr. Jones gave each of his 3 children $2.65 to spend for Christmas. How much did he give them altogether?
2. A boy owned 3 kites, each of them having 155 feet of string. How much string had the three together?
3. Nellie had four brothers. She bought for each of them a pair of gloves costing $1.19. How much did they all cost her?
4. Harry gave a dinner to 4 of his friends. It cost him $1.90 for each person. What was the whole expense of the dinner?
5. Susan and two of her friends each made 144 chocolate creams for a party. How many did they all make?
6. Multiply:

248	327	299	185	619	298
2	3	4	5	2	3
269	158	317	192	261	458
2	3	4	5	4	2
257	196	184	219	313	471
3	4	5	4	3	2

7. A candy store keeper bought 4 barrels of mixed candy, each weighing 295 pounds. How many pounds did he buy in all?
8. Herman made a collection of United States stamps, one of German stamps and a third of mixed stamps. There were 249 stamps in each collection. How many stamps had he altogether?
9. Amelia and her three sisters each had 193 buttons on her button string. How many buttons had they altogether?
10. A baker made 156 ginger cookies on each of the first five days of the week. How many did he make in all?

1. Two boys bought the following to complete their camping outfit: 2 blankets at 75¢ each; a frying-pan, a large pail, and a coffee-pot, each costing 27¢; 6 yards of mosquito-netting, at 5¢ a yard; and 2 large boxes, at 35¢ each. Find the cost of the blankets; the cooking-dishes; the netting; the boxes. How much did they pay for all?
2. Alice and Jane gave a party for which they bought the following: 5 pounds of candy at 38¢ a pound; 4 pounds of mixed nuts at 18¢ a pound; 3 quarts of ice-cream at 40¢ a quart; 2 cakes at 50¢ each. Find the cost of the candy; the nuts; the ice-cream; the cakes; the whole cost.
3. John made for his sister a play house out of 4 large store boxes, each costing 15¢. They bought for the house 5 yards of curtain calico, at 3¢ a yard, 3 doll chairs, at 13¢ each, and a small table at 25¢. Find the cost of the boxes; the calico; the chairs. How much did they spend in all?
4. Alice set 4 hens, giving 13 eggs to each hen. How many eggs did she give the 4 hens?
5. Amanda counted the eggs for her father to take to market. There were 5 baskets, each containing 144 eggs. How many eggs were there in all?
6. Henry carried papers 178 days each year for 3 years. How many days did he carry papers in the 3 years? At 2¢ each, how much did he receive for the papers?
7. John bought for his garden 159 tomato plants and the same number each of cabbage and celery plants. How many plants did he buy in all?
8. Herman bought 184 pigeons one year and the next year he sold 3 times as many. How many pigeons did he sell?

1. Mr. Blake divided 82 cents equally between his son and daughter. How much had each child?

   Read 82 as dimes and cents.

   2)82 One-half of 8 dimes equals how many dimes?
   One-half of two cents equals how many cents?
   One-half of 82 cents equals how many cents?

2. Fred had 82 stamps and he gave half of them to William. How many had each then?

3. Find:

½ of 24	2)24	½ of 28	2)28	½ of 60	2)60
⅓ of 36	3)36	⅓ of 63	3)63	⅓ of 39	3)39
⅓ of 66	3)66	⅓ of 93	3)93	⅓ of 96	3)96
¼ of 48	4)48	¼ of 84	4)84	¼ of 44	4)44
¼ of 80	4)80	¼ of 88	4)88	¼ of 120	4)120
⅕ of 55	5)55	⅕ of 50	5)50	⅕ of 155	5)155

4. 5)155 When you divide the 15 by 5 in this problem where do you write the 3? Why? Where do you write the 1? Why?

5. 2)124 2)102 3)156 3)129 4)168 4)204

6. Julia divided 126 shells into 3 equal piles. How many were there in each pile?

7. Elizabeth divided 183 pictures with her 2 sisters, keeping the same number she gave to each. How many did she keep?

8. Four boys sold 164 newspapers, each selling the same number. How many did each sell?

9. Max distributed 106 hand bills, an equal number on each of 2 streets. How many did he leave on each street?

1. Mrs. Smith divided 32 cents equally between her two little girls. How much did each receive?

$\frac{1}{2}$ of 3 tens equals how many tens and how many over?

$2)32=20+12=32$

$10+6=16$ One ten + 2 ones equals how many ones? $\frac{1}{2}$ of 12 ones = ?

$2)\overline{32}$

16 $\frac{1}{2}$ of 32 or 32 divided by 2 = ?

2. $2)\underline{54}$ $2)\underline{38}$ $2)\underline{56}$ $2)\underline{34}$ $2)\underline{36}$ $2)\underline{58}$

3. How many 2's, and how many ones over, in 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, and 19?
4. How many 3's, and how many ones over, in 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, and 23?
5. How many 4's, and how many ones over, in 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, and 36?
6. How many 5's, and how many ones over, in 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, and 39?
7. Seventy-five apples are separated into 3 equal piles. How many are there in each pile?

How many 3's in 7? How many over? What is this 1? How many ones equal 1 ten and 5 ones? How many 3's in 15? How many 3's in 75?

$3)\underline{75}$

8. There are 54 books in a case of 3 shelves, the same number on each shelf. How many are there on each shelf?
9. $3)\underline{48}$ $3)\underline{78}$ $3)\underline{81}$ $3)\underline{84}$ $3)\underline{243}$ $3)\underline{144}$

$4)\underline{96}$ $4)\underline{84}$ $4)\underline{72}$ $4)\underline{64}$ $4)\underline{184}$ $4)\underline{364}$

1. A boat makes a trip of 840 miles in 5 days, going the same distance daily. How many miles does it run in one day?
2. A dealer bought five bicycles for $225. What was the cost of one bicycle?
3. In going to school and returning home, Henry has to walk nine hundred seventy-eight yards. How far does he live from the schoolhouse?
4. A gardener has eight hundred twenty-eight pounds of seed, which he puts into four-pound sacks. How many sacks will be required?

Divisor or number to divide by } $2)\overline{800}$ *Dividend* or number to be divided.
$\overline{400}$ *Quotient* or answer.

5. Find the quotients:

$2)\overline{800}$	$2)\overline{290}$	$5)\overline{150}$	$4)\overline{180}$	$5)\overline{470}$	$3)\overline{987}$
$3)\overline{678}$	$5)\overline{345}$	$2)\overline{178}$	$3)\overline{171}$	$4)\overline{172}$	$5)\overline{175}$
$4)\overline{896}$	$3)\overline{294}$	$4)\overline{188}$	$2)\overline{250}$	$5)\overline{250}$	$5)\overline{215}$
$5)\overline{595}$	$4)\overline{372}$	$2)\overline{636}$	$4)\overline{272}$	$3)\overline{672}$	$3)\overline{648}$

6. Mary's mother made 215 lemon cookies for the children to eat while they were camping. They camped 5 days. How many cookies would they have for each day?
7. Andrew bought a box containing 300 marbles. He divided them equally among four boys. How many marbles had each?
8. One fall Allan watched 4 squirrels store acorns in a hollow tree. On counting the acorns he found there were 288. If each squirrel carried the same number, how many acorns did one carry?

1. How many 2-cent stamps can be bought for $5.76?
2. At 3 cents a yard, how many yards of ribbon can be bought for $4.05?
3. There were 640 marbles in 5 boxes, the same number in each box. How many were there in one box?
4. How many bottles of ink can be bought for $8.05, at 5 cents each?
5. $2\overline{)457}$ $228\frac{1}{2}$ How many 2's in 4? How many 2's in 5 and how many over? How many 2's in 17? How many remaining? Write the remainder thus: $\frac{1}{2}$, and place it to the right of the quotient.
6. Find the quotients:

$2\overline{)894}$	$2\overline{)895}$	$2\overline{)962}$	$2\overline{)769}$	$2\overline{)541}$
$3\overline{)217}$	$3\overline{)849}$	$3\overline{)755}$	$3\overline{)314}$	$3\overline{)375}$
$4\overline{)645}$	$4\overline{)474}$	$4\overline{)867}$	$4\overline{)716}$	$4\overline{)419}$
$5\overline{)600}$	$5\overline{)736}$	$5\overline{)598}$	$5\overline{)807}$	$5\overline{)670}$

7. How many feet in one side of a square whose perimeter (distance around) is 588 feet?
8. The perimeter of a rectangle is 586 feet. How many yards in it?
9. At 4 cents a dozen, how many dozen buttons can you buy for $3.37?
10. A train traveled 128 miles in 3 hours. How many miles did it travel each hour?
11. At 4 cents a pound, how many pounds of sugar can you buy for $4.86?
12. At $3 a barrel, how many barrels of apples can be bought for $77?
13. At 3 cents a dozen, how many dozen jackstones can you buy for $5.75?

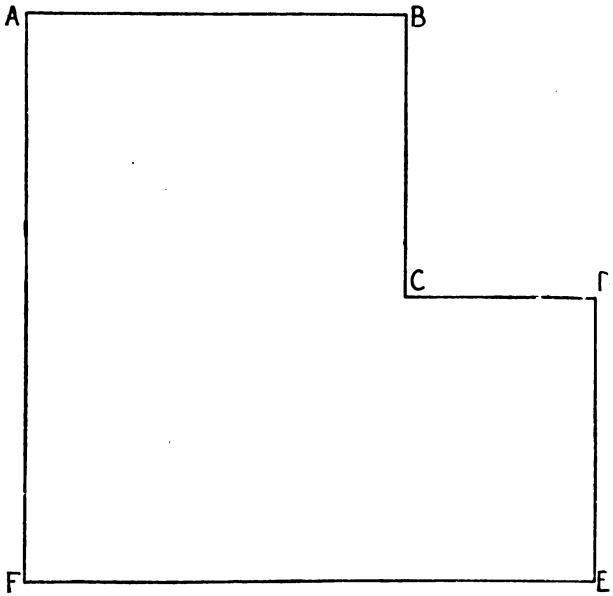
Mrs. Wilson's Laundry Bill for March.

List.	Price for each piece.	Number of Pieces.			
		First Week.	Second Week.	Third Week.	Fourth Week.
Collars	3¢	6	8	5	4
Cuffs, per pair	5¢	4	5	6	3
Handkerchiefs	2¢	7	8	10	12
Towels	1¢	15	12	11	9
Aprons	5¢	2	3	3	4

Answer all you can orally.

1. How much did the collars cost each week? The cuffs? The handkerchiefs? The towels? The aprons?
2. What was the whole bill for each week?
3. How much did the collars cost for the whole month? The cuffs? The handkerchiefs? The towels? The aprons?
4. How much did the collars and cuffs together cost for each week? For the month?
5. The cuffs cost how much more than the collars for the whole month?
6. How much more did the collars cost the first two weeks than the last two?
7. How much more did the handkerchiefs cost, the last 2 weeks than the first 2 weeks?
8. What article of clothing cost the most for any one week?
9. What article cost the most for the month?
10. What week was the laundry bill largest?
11. What week was it smallest?
12. Add the bills of the 4 weeks and divide the sum by 4.
13. At the price given in the list, what would it cost to have five pieces of each kind laundered three different times?
14. Make a laundry bill for yourself.

1. Draw a line 2 inches long.
2. Divide it into two equal parts.
3. Let the inches stand for feet.
4. How many feet does the line stand for?
5. Let each inch stand for 1 yard.
6. How many yards does the line stand for?
7. Draw a line 3 inches long.
8. Let each inch stand for 1 yard.
9. How many yards does the line stand for?
10. Draw a line 4 inches long. If each inch stands for one yard, how many yards does the line stand for?
11. Draw a line 1 inch long. Let it stand for 1 yard. How many feet does it stand for?
12. Draw a line 2 inches long. Let it stand for 2 yards. One-half of the line stands for what? One-half of the line means how many feet?
13. When one inch stands for 1 foot, a 4-inch line means how many feet?
14. When one inch stands for 1 yard, a 4-inch line stands for how many yards?
15. When one inch stands for 1 yard, a 4-inch line means how many feet?
16. Let 1 inch stand for 1 yard. Draw a two yard line; a three yard line; a four yard line. How long is each line? How many yards does each line stand for?
17. Draw the plan of a table in which 1 inch shall stand for 1 foot. The table is 3 feet wide and 8 feet long. How long and how wide will your drawing be?
18. Draw a plan of a signboard 6 feet long and 3 feet wide. Your drawing is to be 1 inch wide and 2 inches long. In this drawing 1 inch will stand for how many feet?
19. A road ten miles long was shown on a map by a line 2 inches long. On this map one inch meant what length?



1. The above is the plan of a lot drawn to the scale, 1 inch to 12 feet. This means that an inch in length in the drawing stands for 12 feet in any line in the lot.
2. How many feet is it from A to B?
3. How many feet is it from A to F?
4. How many feet is it from F to E? From D to E? From B to C? From C to D? From A through B to C? From A through F to E?
5. How many feet of fence are needed to fence the lot?
6. There are 3 feet in a yard, how many yards from A to F? From A to B? How many yards around the lot?
7. How many feet from A to C?
8. How many feet from F to C?
9. How many yards from A to C?
10. How many yards from F to C?
11. How many yards around the lot and from F to C over?

1. If the lot were square with sides the length of A to F, how many yards around it? If square with sides the length of A to B, how many yards around it? If square with sides the length of B to C, how many yards around it?
2. Taking steps 2 feet long, how many steps would one take in walking once around the lot described on page 47?
3. Add:

427	725	687	678	246	672	608
685	982	843	294	864	573	793
981	693	921	892	268	957	892
684	798	692	684	462	391	181

4. Subtract:

246	907	872	405	690	672	492
192	265	396	272	371	395	309

5. Multiply:

374	826	987	654	982	658	972
2	3	4	5	4	3	5

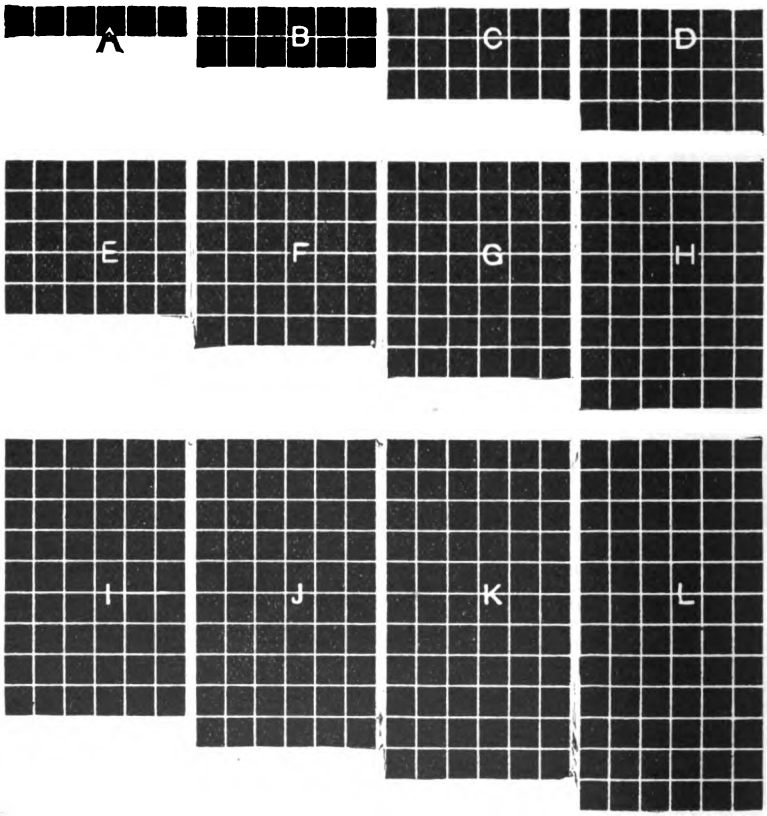
6. Divide:

2)147	3)765	4)729	4)912	5)675	3)405	5)752

7. A car is 64 feet long, how long is a train of 4 such cars? Of 5 such cars?
8. A boy lives 624 feet from the store. In going to the store and returning, how many feet will he walk? How many yards? If he goes to the store and returns once a day, 4 days in the week, how many yards will he walk?
9. A rail in the street car track is 10 yards long. How many rails in 50 yards of a single rail of track? In both rails of track? In all the rails of 2 tracks?

Answer all you can orally.

1. How many days are there in a week?
2. How many of these are working days?
3. How many working days in 2 weeks? In 3 weeks? In 4? In 5? In 6? In 7? In 8? In 9? In 10? In 11? In 12?
4. How many eggs in a half dozen? In one and one-half dozen?
5. How many inches in one foot? In a half foot?
6. How many 6-inch rulers can be made from a stick 2 feet long? From a stick 5 feet long?
7. How many candle wicks, each six inches long, can be made from a yard of wicking?
8. Allowing six inches for each wick, how many inches of wicking will be needed to furnish 9 lamps? For 11 lamps?
9. How many 6-inch hair ribbons will a yard of ribbon make?
10. A wheel that is 6 inches around the tire will turn how many times in going 36 inches? 48 inches?
11. A wheel that is 6 inches around the tire will turn how many times in rolling 2 feet?
12. Julia found 30 eggs in the hay mow. How many half dozens did she find?
13. Mrs. Williams bought a half dozen eggs each working day of the week. How many did she buy in all?
14. Fifty-four lemons are how many dozen lemons? How many half dozens?
15. The oranges in a store window were arranged in 7 groups of a half dozen each. How many oranges were in the window?
16. A milkman made the following sales, at 6¢ a quart: 5 quarts of milk; 3 quarts; 8 quarts; 6 quarts; 11 quarts. How much did he make from each sale? From all the sales?



1. How many squares in A? How many rows of six squares each in B? In C? In D? E? F? G? H? I? J?
2. A contains 6, B contains 12. How many in C? D? E? F? G? H? I? J? K? L?
3. A equals what part of B? What part of C? Of D? E?
4. 6 is what part of 12? What part of 18? Of 24? 30? 36? 42? 48? 54? 60? 66? 72?
5. B equals how many A's? What part of D? F? H? J? L?

1. 12 equals how many 6's? What part of 24? 36? 48?
2. C equals how many A's? What part of F? I? L?
3. 18 equals how many 6's? What part of 36? 54? 72?
4. D equals how many A's? How many B's? What part of H? Of L?
5. 24 equals how many 6's? How many 12's? What part of 48? Of 72?
6. E equals how many A's? What part of J?
7. 30 equals how many 6's? What part of 60?
8. F equals how many A's? How many B's? How many C's? What part of L?
9. 36 equals how many 6's? How many 12's? How many 18's? What part of 72?

TABLE OF SIXES

6×1= 6	6×4=24	6×7=42	6×10=60
6×2=12	6×5=30	6×8=48	6×11=66
6×3=18	6×6=36	6×9=54	6×12=72

2	12	22
32	**6**	42
52	62	72

3	13	23
33	**6**	43
53	63	73

4	14	24
34	**6**	44
54	64	74

5	15	25
35	**6**	45
55	65	75

6	16	26
36	**6**	46
56	66	76

7	17	27
37	**6**	47
57	67	77

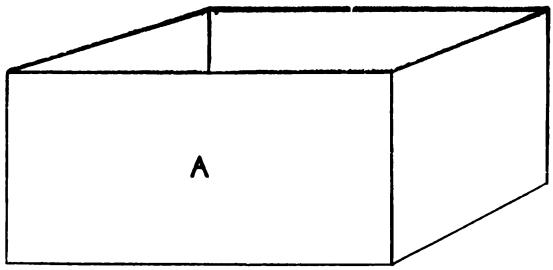
8	18	28
38	**6**	48
58	68	78

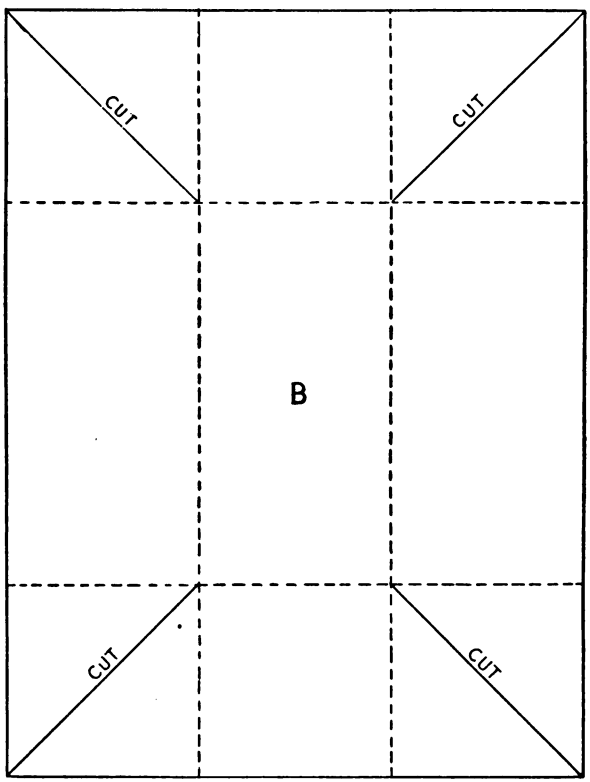
9	19	29
39	**6**	49
59	69	79

Add the heavy center number to each number in the same large square. Subtract it from each larger number. Multiply and divide in the same way.

1. The height of a tree is 72 feet, which is 6 times the distance around it at the ground. How many feet around it at the ground?
2. If I buy 5 eight-cent postage stamps and give $1 in payment, how much change should I receive?
3. Charles traveled 87 miles on his wheel in 3 days. At the same rate how far can he go in 5 days? In 6 days?
4. In one field a farmer has 96 sheep, which are one-sixth of his entire flock. How many sheep has he?
5. If $120 were divided equally among 6 men, how much money would each one receive? How much would 2 receive together? 3 together?
6. A piece of cloth is 54 yards long. One-sixth of it was sold at $2 a yard. How much was received from the sale? How much of the piece was left? How much was it worth at the same rate?
7. If a man earns $71 a month and spends $52 a month, how much will he save in that time? How much will he save in 6 months?
8. How many hours are there in 1 day? In one-half a day? In one-sixth of a day? How many hours are there in 6 days?
9. A barrel holds $31\frac{1}{2}$ gallons; how many gallons will 6 barrels hold?
10. A farmer owned 486 acres of pasture land. He bought one-sixth as many acres more. How many acres did he buy? How many acres did he then own?
11. A mile from north to south is 8 blocks, and from east to west 13 blocks. How many blocks will a boy travel in going 6 miles north and 6 miles west?
12. What is the cost of 27 yards of sewer pipe at $2 a foot?
13. How many weeks will it take a man to save $297 if he saves $3 each week?

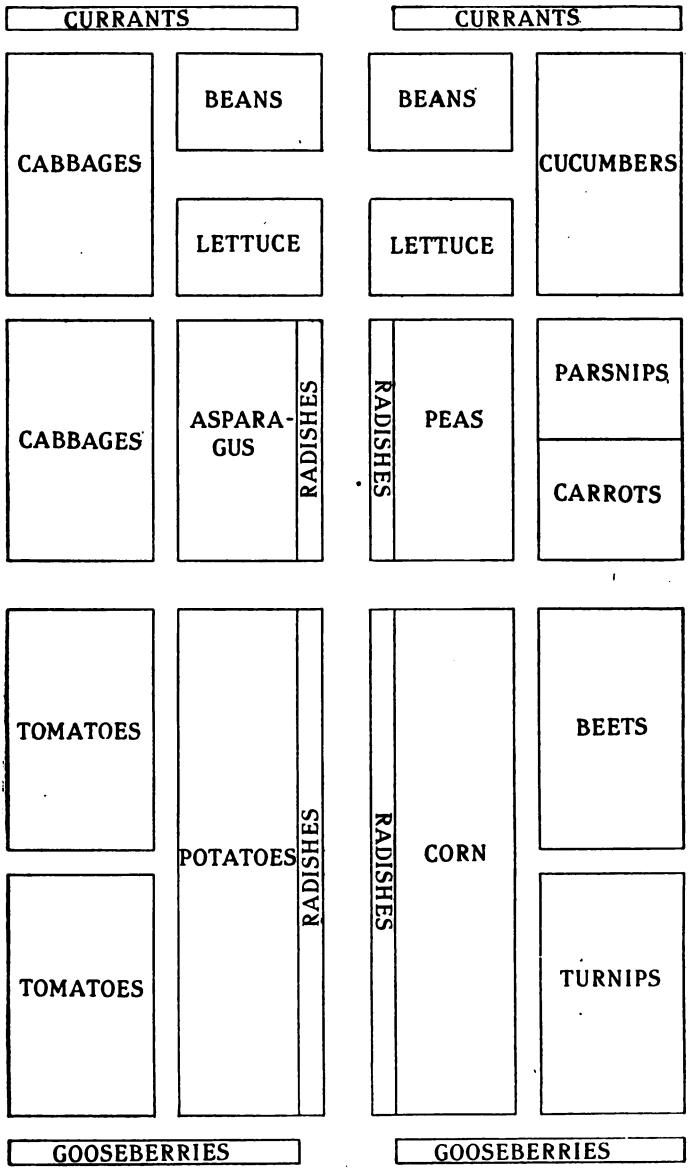
1. How many square inches in a rectangle that is 6 inches long and 3 inches wide? (See page 4.) One that is 6 inches long and 6 inches wide? One that is 6 inches long and 8 inches wide? One that is 6 inches long and 12 inches wide?
2. How many square inches in a 6 inch square? Draw one.
3. A 2 inch square equals what part of a 6 inch square?
4. A 3 inch square equals what part of a 6 inch square?
5. 3 feet in length is called by what name? What is a figure 3 feet square called?
6. Cut from a newspaper a square foot of paper. Use it for a pattern and cut 8 more pieces. Make a square by placing these pieces on the floor. What are the dimensions of this square in feet? In yards?
7. One square yard equals how many square feet?
8. On page 4 suppose each small square were one foot square. How wide would the figure be? How long? How many square feet would it contain?
9. On page 4 suppose each square in B, E, and F together were one foot long. How long would the figure B E F be? How wide? How many square feet would it contain? What would be its perimeter in feet? In yards? Find a square yard in it.
10. How many square yards in a figure 2 yards square? How many feet long is one side of such a figure? How many square feet does such a figure contain?
11. Let one inch stand for a foot and draw figures containing 36 square inches. What 4 different shapes might such figures be? Why?
12. Two blotters each contain 12 square inches. One was 2 inches wide, the other was 3 inches. What was the length of each?





1. How long is the box A? How deep? How many square inches in one side?

1. B is a piece of paper the size from which to cut such a box without a cover.
2. How long is this paper? How wide is it?
3. The paper is then a rectangle of ———— inches by ———— inches.
4. What is the area of this paper?
5. A box is 2 inches long, 2 inches wide and 2 inches high. How many square inches in the sides and bottom of the box?
6. What are the dimensions (length and breadth) of the piece of paper necessary to make it? What is its area?
7. What are the dimensions of the piece of paper necessary to make a box 3 inches long, 3 inches wide, and 3 inches deep, without a cover? What is the area of the paper?
8. What are the dimensions of a box 4 inches deep that can be made as in problem 7, from a piece of paper 12 inches long and 12 inches wide?
9. A box is 4 inches long, 3 inches wide and 2 inches deep. How large must the paper be in order to make it without a cover? How many square inches of paper are necessary?
10. What are the dimensions of the piece of leather necessary to line a box that is 6 inches long, 2 inches wide, and 2 inches deep, without a cover? How many square inches? What will the leather for such a box cost at 6¢ a square inch?
11. How many square feet of cloth are needed to line a box 6 feet long, 3 feet wide, and 2 feet deep, with a cover?
12. The length of a room is 6 yards, its height 4 yards. How many square yards in one side of the room? In the 2 sides? The room is 5 yards wide, what is the area of one end wall? Of both? Of the ceiling? Of the floor? Of the entire inside surface of the room?


CURRANTS
CURRANTS
CABBAGES
BEANS
LETTUCE
BEANS
LETTUCE
CUCUMBERS
CABBAGES
ASPARA-GUS
RADISHES
RADISHES
PEAS
PARSNIPS
CARROTS
TOMATOES
POTATOES
RADISHES
RADISHES
CORN
BEETS
TOMATOES
TURNIPS
GOOSEBERRIES
GOOSEBERRIES

1. Find the length of the plan; the width; the area. This plan of a vegetable garden is drawn to a scale of 8 feet to 1 inch. $\frac{1}{8}$ of an inch equals how many feet? $\frac{1}{4}$ of an inch equals how many feet? $\frac{1}{2}$ an inch? 1 inch?
2. What is the length of the garden? The width?
3. What are the dimensions of each of the currant patches? The areas? How many square feet in the two together?
4. Find the dimensions and the area of each space given to gooseberries.
5. Find the length of the long middle path; the width; the number of square feet in it.
6. How wide is each of the other paths?
7. How long is each bean bed? How wide? What is the area of both?
8. Find the dimensions and the area of each lettuce bed. How many square feet in the 2 lettuce beds?
9. Find the dimensions and the area of each of the smaller spaces given to radishes; of each of the larger spaces. How many square feet in all are given to radishes?
10. What are the dimensions of the asparagus bed? What is the area?
11. Answer the same questions for the space given to peas.
12. Find the dimensions and area of the cucumber bed.
13. What other spaces have the same area?
14. How many square feet in all are given to cabbages? To tomatoes?
15. The parsnip patch is how wide? How long? What is its area? Answer the same questions for the carrot patch.
16. The parsnip space and the carrot space together are equal in area to what space?
17. Find the dimensions and the area of the space given to corn; to potatoes.
18. How many square feet in all are given to vegetables?

SALES.

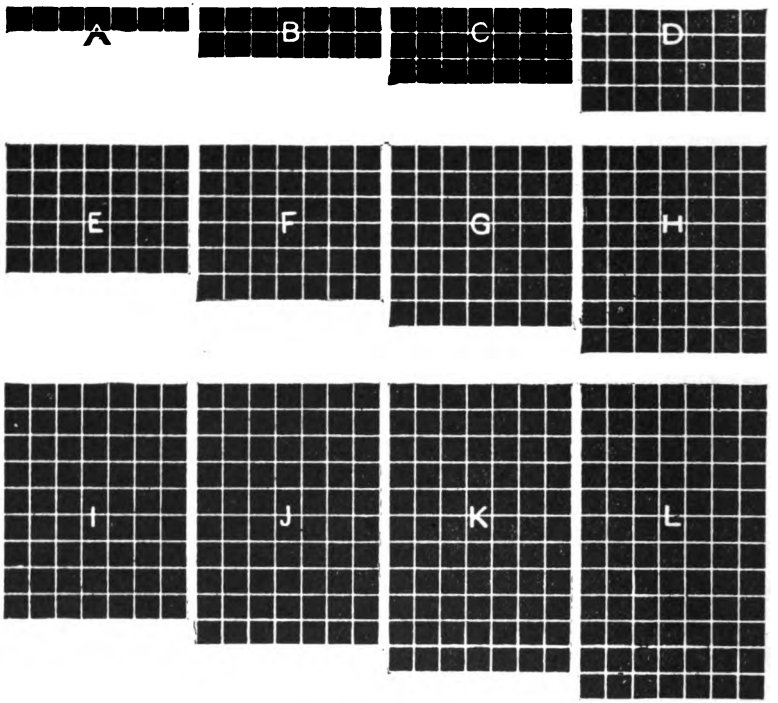
Paper.	Price.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
Tribune	2¢	5	8	3	4	6	8
Free Press	2¢	3	5	9	7	3	9
News	1¢	7	9	8	5	7	7
Enquirer	3¢	2	6	6	9	9	2
Herald	2¢	2	4	9	3	9	9
Dispatch	1¢	3	8	3	7	8	8
Post	2¢	4	2	7	5	9	9

Always answer all you can orally.

Arthur Hall kept a newspaper stand and this table shows his sales for one week.

1. How many copies of each paper did he sell in the week?
2. How many copies of all papers did he sell in the week?
3. How many papers did he sell each day?
4. What sum of money did he receive each day for the Tribune? Free Press? News? Enquirer? Herald? Dispatch? Post?
5. What sum of money did he receive each day on all the papers?
6. What sum of money did he receive in the whole week on each one of the papers?
7. What sum of money had he received during the week from the sale of all the papers?
8. His pay was one-third of all he received. How much did he earn?
9. What paper sold best during the whole week?
10. Of what paper were the sales smallest for the week?
11. What paper brought in the smallest amount of money?
12. What paper sold best on Monday? Tuesday? Wednesday? Thursday? Friday?
13. On Monday there were how many sales of Tribune and Free Press?
14. On Tuesday there were how many sales of News and Enquirer?

1. How many days are there in a week?
2. In 14 days how many weeks?
3. How many days are there in 2 weeks? In 3? 4? 5? 6? 7? 8? 9? 10? 11? 12?
4. How many weeks are there in 21 days? In 28 days? In 35? 42? 49? 63? 84?
5. A lady bought a quart of milk each day of one week. How many pints did she buy in all?
6. In all the common years February has 28 days. How many weeks has February in those years?
7. Alice stayed with her grandmother 21 days. How many weeks was she there?
8. A boy sold newspapers every day for 63 days. How many weeks did he sell papers?
9. John is 7 years old and his brother William is 4 times as old as John. How old is William?
10. A girl spent 70¢ for ribbon. How many dimes did she spend?
11. There are six working days in one week. How many working days are there in 7 weeks?
12. Elsie is 7 years old. Her mother is 35 years old. How many times Elsie's age is her mother's age?
13. The Christmas holidays were two weeks long. How many days long were they?
14. Jennie paid 7¢ a pound for loaf sugar. How many pounds could she buy for 63¢?
15. The summer vacation was 6 weeks long. How many days long was it?
16. George made a trip of 8 weeks. How many days was he away?
17. A term of school was 12 weeks long. How many school days were in it? How many days passed from the beginning to the end of the term?



1. How many squares in A? How many rows of 7 squares each in B? How many such rows in C? In D? E? F? G? H? I? J?
2. A equals 7, B equals 14. To what is C equal? D? E? F? G? H? I? J? K? L?
3. A equals what part of B? What part of C? Of D? E? F? G? H? I? J? K? L?
4. 7 equals what part of 14? What part of 21? Of 28? 35? 42? 49? 56? 63? 70? 77? 84?
5. B equals how many A's? What part of D? F? H? J? L?
6. 14 equals how many 7's? What part of 28? 42? 56? 70? 84?

1. C equals how many A's? What part of F? I? L?
2. 21 equals how many 7's? What part of 42? 63? 84?
3. D equals how many A's? How many B's? What part of H? L?
4. 28 equals how many 7's? How many 14's? What part of 56? 84?
5. E equals how many A's? What part of J?
6. 35 equals how many 7's? What part of 70?
7. F equals how many A's? How many B's? C's? What part of L?
8. 42 equals how many 7's? How many 14's? How many 21's? What part of 84?
9. 49 equals how many 7's?

TABLE OF SEVENS.

7×1= 7	7×4=28	7×7=49	7×10=70
7×2=14	7×5=35	7×8=56	7×11=77
7×3=21	7×6=42	7×9=63	7×12=84

2	12	22
32	**7**	42
52	62	72

3	13	23
33	**7**	43
53	63	73

4	14	24
34	**7**	44
54	64	74

5	15	25
35	**7**	45
55	65	75

6	16	26
36	**7**	46
56	66	76

7	17	27
37	**7**	47
57	67	77

8	18	28
38	**7**	48
58	68	78

9	19	29
39	**7**	49
59	69	79

Add the heavy center number to each number in the same large square. Subtract it from each number larger than itself. Multiply and divide in the same way.

1. Add upward, downward, by lines to the right and to the left:

7	7	6	4	5	3	2	7
7	1	2	3	4	5	6	7
7	5	6	7	3	7	5	4
7	4	7	7	7	6	7	5
7	6	6	4	7	7	7	6
7	7	7	6	6	4	3	7
1	3	3	2	2	7	4	7

2. Add these numbers; subtract them; and multiply them:

14	28	56	21	42	84	35	70	63	78	59
7	7	7	7	7	7	7	7	7	7	7

83	75	94	67	77	89	48	99	132	576
7	7	7	7	7	7	7	7	7	7

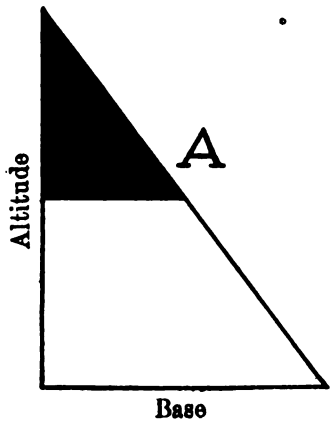
3. Divide:

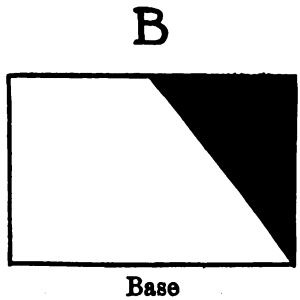
7)14	7)28	7)42	7)21	7)56	7)70
7)35	7)49	7)63	7)84	7)77	6)72

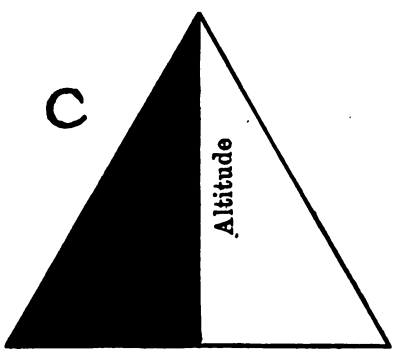
4. 14 equals how many 7's? 42 equals how many 7's?
28 equals how many 7's? 49 equals how many 7's?
56 equals how many 7's? 21 equals how many 7's?
35 equals how many 7's? 77 equals how many 7's?
63 equals how many 7's? 84 equals how many 7's?

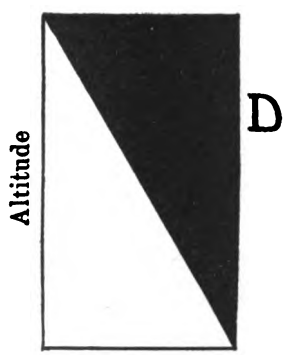
5. 7 is $\frac{1}{3}$ of _____. 7 is $\frac{1}{6}$ of _____.
7 is $\frac{1}{6}$ of _____. 7 is $\frac{1}{4}$ of _____.
7 is $\frac{1}{8}$ of _____. 7 is $\frac{1}{7}$ of _____.

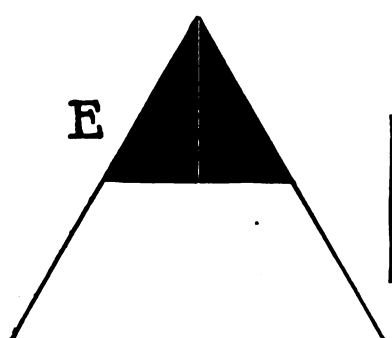
1. 7 is $\frac{1}{2}$ of _____. 7 is $\frac{1}{8}$ of _____.
   7 is $\frac{1}{11}$ of _____. 7 is $\frac{1}{10}$ of _____.
   7 is $\frac{1}{12}$ of _____. 6 is $\frac{1}{9}$ of _____.
   4 is $\frac{1}{8}$ of _____. 7 is $\frac{1}{7}$ of _____.
   6 is $\frac{1}{6}$ of _____. 4 is $\frac{1}{9}$ of _____.
   8 is $\frac{1}{4}$ of _____. 9 is $\frac{1}{3}$ of _____.
   10 is $\frac{1}{5}$ of _____. 11 is $\frac{1}{6}$ of _____.
2. How many 7's are there in 15? In 29?
   How many 7's are there in 37? In 45?
   How many 7's are there in 50? In 25?
   How many 7's are there in 57? In 48?
   How many 7's are there in 86? In 78?
   How many 7's are there in 73? In 82?
3. One man digs 27 feet of ditch; another 17 feet, and a boy digs 7 feet. How many feet do all dig?
4. On one farm there are 754 feet of fence; on another 577 feet. How much more fence is there on the first farm than on the second?
5. A grain dealer bought 378 bushels of wheat in one place and 747 bushels in another. He sold 707 bushels; how many bushels had he left?
6. A man bought 7 horses at $65 apiece; how much did he pay for all?
7. A train travels 252 miles in 7 hours; how far does it go in 1 hour if the speed is always the same?
8. If 7 yards of silk cost $8.75, what will be the cost of 5 yards of the same?
9. In digging a well, 63 feet deep, 14 feet were dug through clay. If $\frac{1}{9}$ of the well was dug each day, how many days were spent in digging through the clay?
10. A farmer made a wire fence 14 yards long. He put in posts 7 feet apart, and 7 rows of wire. How many posts were there? How many yards of wire did he use?

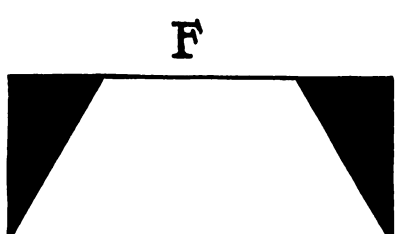

A
Altitude
Base


B
Base


C
Altitude


Altitude
D


E


F

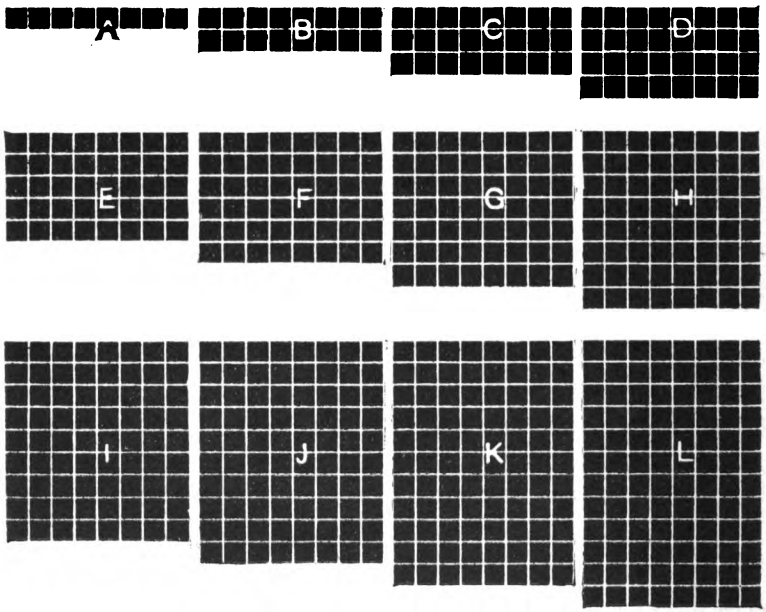
1. What is the altitude of figure A, page 64? The base?
2. Find the middle point of the altitude and the middle point of the long side of the triangle. Suppose the triangle cut on a straight line which passes through these two points and the parts turned about to the side of A, as in B.
3. What do we call the figure B? What is its length? What is its width? What is the area of B?
4. What is the area of the triangle A?
5. Cut a 4-inch square. Draw a line between two opposite corners, and on this line cut the square in two. What is the altitude of one of the triangles thus made? The base? Find the area.

   The side upon which a triangle is supposed to rest, is called its base. The shortest distance from its base to its highest point is called its height or altitude.
6. What are the dimensions (base and altitude) of the triangle C? Draw a line from the center of the base to the point of the angle opposite. Suppose the left side of the triangle C to be turned about and laid upon the longest side of C, as in the figure D. What is the figure D?
7. What are the dimensions of D? What is its area?
8. What is the area of the triangle C?
9. Suppose the base of the triangle C were 8 feet and its altitude 8 feet, what would be the area of the triangle?
10. The area of such a triangle as C may be found in another way, as in the triangle E.
11. Find the middle points of the two sides of the triangle, and suppose the triangle to be cut through them and the top part equally divided and placed on the sides of the lower part of the triangle, as in the figure F. What figure do we then have? What are its dimensions and its area?

1. Draw the following 9 triangles and find the area of each:
   The base is 6 inches and the altitude 4 inches.
   The base is 8 inches and the altitude 6 inches.
   The base is 9 inches and the altitude 4 inches.
   The base is 5 inches and the altitude 8 inches.
   The base is 12 inches and the altitude 10 inches.
   The base is 11 inches and the altitude 14 inches.
   The base is 18 inches and the altitude 12 inches.
   The base is 16 inches and the altitude 10 inches.
   The base is 15 inches and the altitude 14 inches.
2. A car contains 9 seats, each of which holds 7 persons. How many persons can be seated in the car?
3. There are 3 cars of this size in a train. How many persons can be seated in the train?
4. In front of a house there are 25 feet of sidewalk 7 feet wide. How many square feet in the sidewalk?
5. A door is 7 feet high and 3 feet wide. How many square feet in the door? How many square feet if the door were $3\frac{1}{2}$ feet wide?
6. How many books would there be in a bookcase containing 7 shelves, if there were 12 books on each shelf? 11 on each shelf? 9 on each shelf? 10 on each shelf? 20 on each shelf? 30 on each shelf?
7. A table is 7 feet long and 4 feet wide. What is its perimeter? What is its area?
8. There are 35 pupils enrolled in one schoolroom. If 5 are away, how many are present? What part of the whole number is absent? What part of the whole number is present?
9. A fruit dealer sells pineapples at 34¢ apiece. How much money will he receive for 7 pineapples?
10. If I save $57 a month for 7 months, how much more must I save to have $700?

Always answer all you can orally.

1. Review pages 8 and 10 as oral work.
2. How many quarts are there in a peck?
3. Two pecks equal how many quarts?
4. A grocer bought a peck of gooseberries and sold half of them. How many quarts did he sell?
5. A woman picked a peck and a half of currants. How many quarts did she pick?
6. At 9¢ a quart, what will a peck of blackberries cost?
7. At 4¢ a quart, what will 1½ pecks of seed beans cost?
8. How many pints in a quart? How many quarts in a gallon? How many pints in a gallon?
9. What part of a gallon is one pint?
10. At 80¢ a gallon, what will one pint of ice-cream cost?
11. At 18¢ a pint, what will a gallon of whipping-cream cost?
12. At 96¢ a gallon, wholesale, what will a pint of varnish cost?
13. 8 dimes equal how many pennies?
14. 8 quarts of milk cost how much at 24¢ a gallon?
15. A party of 40 people were seated at 5 tables. How many were at each table?
16. Charlie earned 8¢ a day for 4 days, while Ben earned the same amount each day for 7 days. What was the difference in the whole amount each earned?
17. Mr. Brown has lived 8 times as long as his grandson, who is 10 years old. How old is Mr. Brown?
18. At 44¢ a gallon, what will be the cost of a 2-quart can of paint?
19. At 3¢ a pint, what will a gallon of Jersey milk cost?
20. A girl paid 56¢ for 8 yards of calico. What was the cost per yard?
21. If a family uses 6 pints of milk a day, how many pints will be used in 8 days?



1. How many squares in A? How many rows of 8 squares each in B? How many such rows in C? In D? E? F? G? H? I?
2. A equals 8, B equals 16. To what is C equal? D? E? F? G? H? I? J? K? L?
3. A equals what part of B? What part of C? Of D? E? F? G? H? I? J? K? L?
4. 8 equals what part of 16? What part of 24? Of 32? 40? 48? 56? 64? 72? 80? 88? 96?
5. B equals how many A's? What part of D? F? H? J? L?
6. 16 equals how many 8's? What part of 32? 48? 64? 80? 96?
7. C equals how many A's? What part of F? I? L?

1. 24 equals how many 8's? What part of 48? 72? 96?
2. D equals how many A's? How many B's? What part of H? L?
3. 32 equals how many 8's? How many 16's? What part of 64? Of 96?
4. E equals how many A's? What part of J?
5. 40 equals how many 8's? What part of 80?
6. F equals how many A's? B's? C's? What part of L?
7. 48 equals how many 8's? How many 16's? How many 24's? What part of 96?
8. 56 equals how many 8's?
9. H equals how many A's? How many B's? D's?
10. 64 equals how many 8's? 16's? 32's?

TABLE OF EIGHTS

8×1= 8	8×4=32	8×7=56	8×10=80
8×2=16	8×5=40	8×8=64	8×11=88
8×3=24	8×6=48	8×9=72	8×12=96

2	12	22
32	**8**	42
52	62	72

3	13	23
33	**8**	43
53	63	73

4	14	24
34	**8**	44
54	64	74

5	15	25
35	**8**	45
55	65	75

6	16	26
36	**8**	46
56	66	76

7	17	27
37	**8**	47
57	67	77

8	18	28
38	**8**	48
58	68	78

9	19	29
39	**8**	49
59	69	79

Add the heavy center number to each number in the same large square. Subtract it from each number larger than itself. Multiply and divide in the same way.

1. Add upward, downward, by lines to the right and to the left:

8	8	8	8	8	8	8	8
8	7	8	6	5	8	1	7
8	6	7	4	8	6	2	7
8	5	8	2	8	5	3	6
8	4	3	7	6	7	4	6
8	3	4	5	8	3	5	4
8	2	8	8	7	8	6	4
7	1	6	8	6	8	7	3

2. Add these numbers; subtract them; and multiply them:

32	24	16	48	56	72	64	88	80	40
8	8	8	8	8	8	8	8	8	8

13	25	37	49	79	88	67	98	386	497
8	8	8	8	8	8	8	8	8	8

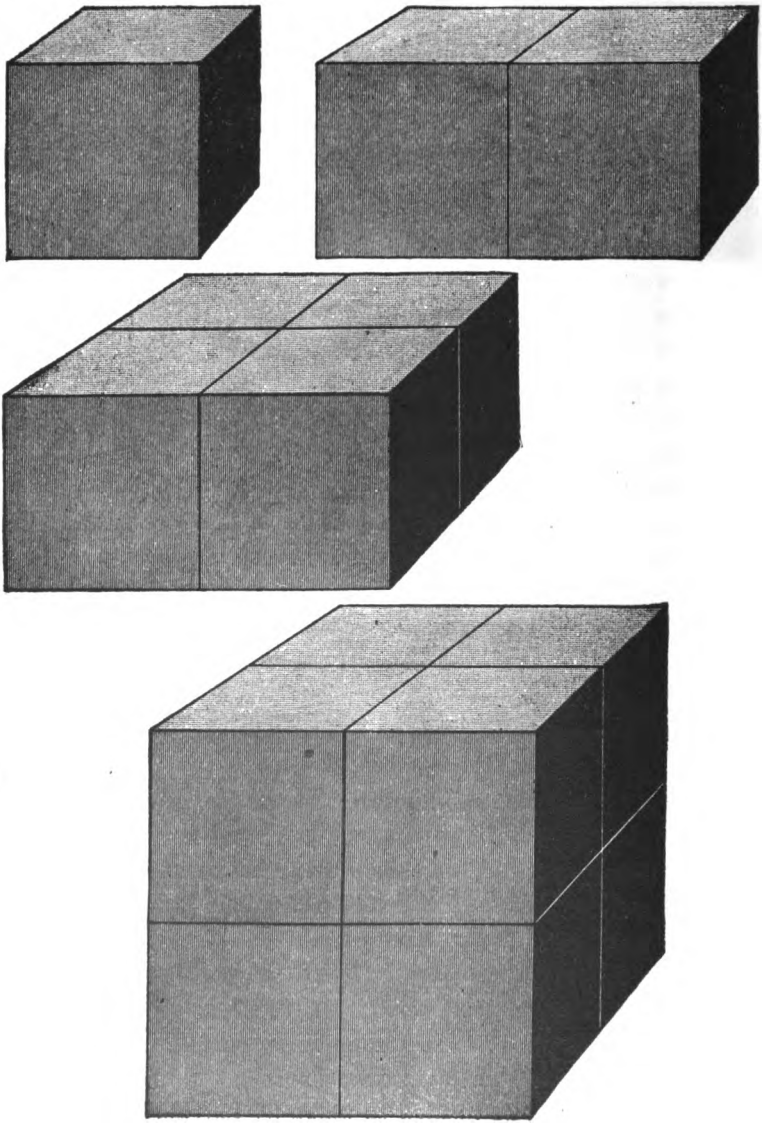
3. Divide:

8)16	8)32	8)48	8)24	8)56	8)72
8)40	8)64	8)88	8)96	8)80	7)84

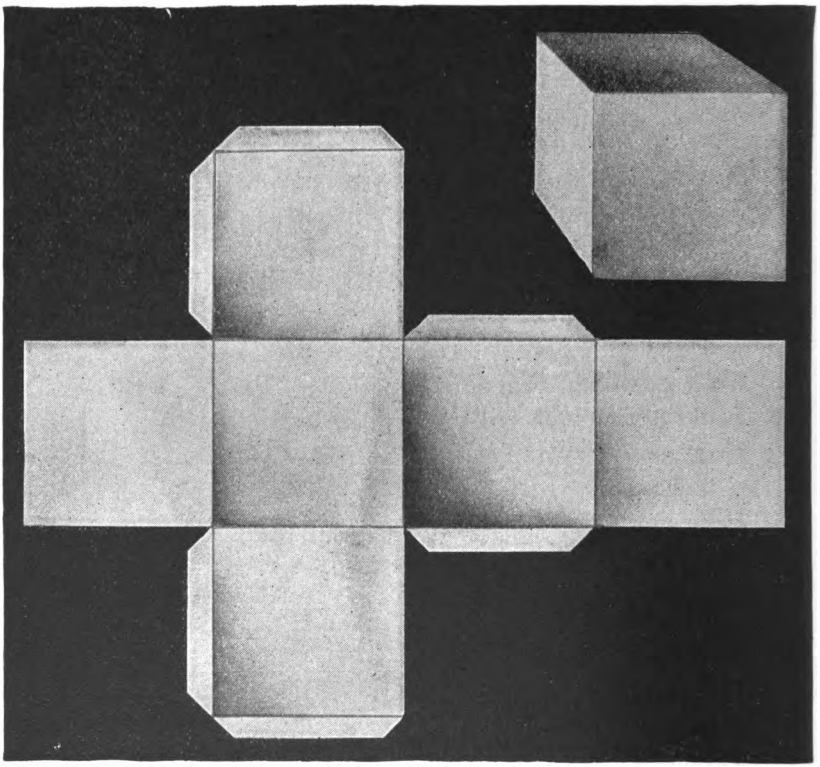
4. 16 equals how many 8's?
32 equals how many 8's?
40 equals how many 8's?
56 equals how many 8's?
88 equals how many 8's?
80 equals how many 8's?
48 equals how many 8's?
64 equals how many 8's?
24 equals how many 8's?
72 equals how many 8's?
96 equals how many 8's?
49 equals how many 7's?

5. 8 is $\frac{1}{3}$ of _____. 8 is $\frac{1}{6}$ of _____.

1. 8 is $\frac{1}{2}$ of _____. 8 is $\frac{1}{6}$ of _____.
   8 is $\frac{1}{4}$ of _____. 8 is $\frac{1}{8}$ of _____.
   8 is $\frac{1}{9}$ of _____. 8 is $\frac{1}{7}$ of _____.
   8 is $\frac{1}{10}$ of _____. 8 is $\frac{1}{12}$ of _____.
   8 is $\frac{1}{11}$ of _____. 7 is $\frac{1}{2}$ of _____.
   6 is $\frac{1}{7}$ of _____. 4 is $\frac{1}{9}$ of _____.
   5 is $\frac{1}{11}$ of _____. 3 is $\frac{1}{8}$ of _____.
2. How many 8's are there in 17? In 34?
   How many 8's are there in 47? In 27?
   How many 8's are there in 56? In 63?
   How many 8's are there in 71? In 81?
   How many 8's are there in 20? In 42?
   How many 8's are there in 59? In 67?
   How many 8's are there in 76? In 30?
   How many 8's are there in 85? In 98?
3. A boy picked 38 quarts of berries in one week, 42 in the second, 28 in the third, and 18 in the fourth. How many quarts did he pick?
4. In one school there are 858 scholars; in another there are 684. How many more are there in one than in the other?
5. A man traveled 284 miles by rail and 8 times as far by boat; how far did he travel by boat?
6. During the summer a family used 248 quarts of milk. During the winter they used $\frac{1}{8}$ more than that. How many quarts did they use during the winter?
7. If one boat holds 5 persons; how many boats will be needed for a party of 40 people?
8. In an orchard there are 56 trees in each row, and $\frac{1}{7}$ as many rows as there are trees in each one; how many rows are there? How many trees in all?
9. If 32 bushels of wheat make 8 barrels of flour; how many bushels will be needed to make 64 barrels?



1. Place two one-inch cubes in a row.
2. Place another row of two one-inch cubes in front of the first row.
3. How many rows of one-inch cubes are there?
4. How many one-inch cubes, or cubic inches, are there in a row? How many are there in both rows?
5. Place four more one-inch cubes in a layer on top of these cubes.
6. How many layers of cubes are there?
7. How many cubic inches are there in a layer? How many are there in both layers?
8. Find a two-inch cube on page 72.
9. Build a two-inch cube with the one-inch cubes.
10. How many layers of one-inch cubes are there in the two-inch cube?
11. How many rows are there in each layer?
12. How many one-inch cubes are there in each row?
13. How many one-inch cubes are there in both rows?
14. How many one-inch cubes are there in both layers?
15. Take away one layer of cubes.
16. How many one-inch cubes are taken? What part of the two-inch cube is taken?
17. Take away one row from the remaining layer.
18. What part of the layer is taken? What part of the two-inch cube is taken?
19. Take away a one-inch cube from the remaining row.
20. What part of the row is taken? What part of the layer is taken? What part of the two-inch cube?
21. A one-inch cube is what part of a two-inch cube? Two one-inch cubes are what part? Three one-inch cubes are what part? Four are what part? Five?
22. How many 1-inch cubes in $\frac{1}{2}$ of a 2-inch cube? In $\frac{1}{4}$ of a 2-inch cube? In $\frac{1}{8}$ of a 2-inch cube?



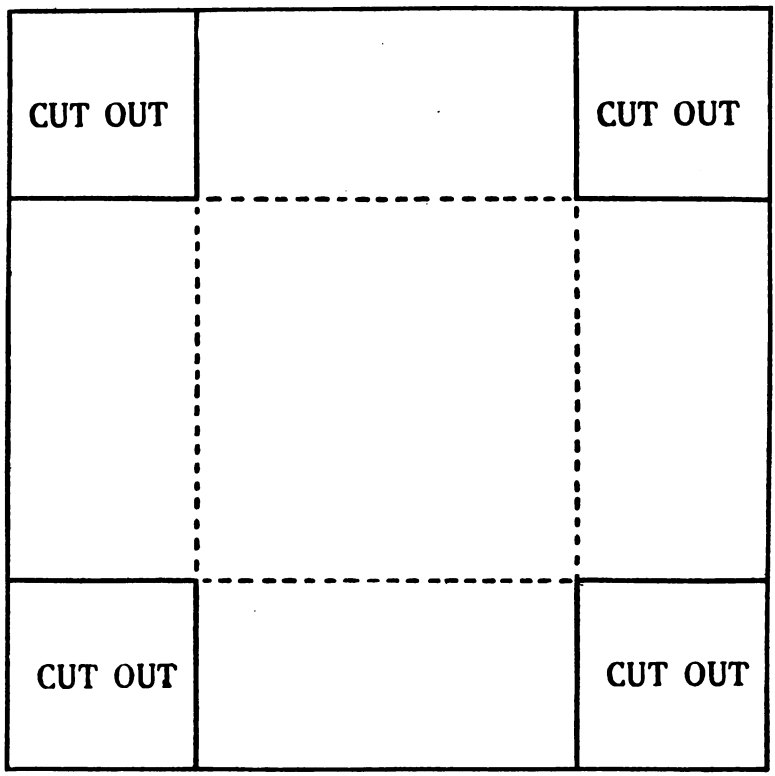
1. A cube has how many faces? What is the shape of each?
2. Draw the pattern of an inch cube, as shown in the picture. Cut it from the paper, fold on the lines, and paste the laps on the inside
3. How many edges has a cube? How many corners?
4. Draw a pattern and make a 2-inch cube.
5. In a 4-inch cube there are how many one-inch cubes?
6. Without thinking of the laps, how many square inches of paper did you use in making the one-inch cube? The 2-inch cube?

1. Build with cubes a solid containing two rows of 3 cubic inches each.
2. What is its length? Its height? Its other dimension, or width?
3. Build a solid containing two layers of two rows of 3 cubic inches.
4. What is its width? Its height? Its other dimension, or length?
5. Build the following solids, tell their dimensions, and the number of cubic inches in each:

   One layer of two rows of 3 cubic inches.
   Two layers of two rows of 3 cubic inches.
   One layer of two rows of 4 cubic inches.
   Two layers of two rows of 4 cubic inches.
   One layer of three rows of 5 cubic inches.
   Two layers of two rows of 5 cubic inches.
   Two layers of one row of 8 cubic inches.
   Two layers of one row of 7 cubic inches.
   Four layers of one row of 4 cubic inches.
   Two layers of one row of 6 cubic inches.
   Two layers of three rows of 3 cubic inches.
   Four layers of one row of 5 cubic inches.
   Three layers of two rows of 4 cubic inches.
   Four layers of three rows of 2 cubic inches.
   One layer of three rows of 8 cubic inches.
   Two layers of one row of 9 cubic inches.
   One layer of two rows of 12 cubic inches.
   Two layers of two rows of 12 cubic inches.
   Two layers of three rows of 12 cubic inches.

6. Give the dimensions of solids containing:

8 cubic inches.	12 cubic inches.
6 cubic inches.	10 cubic inches.
9 cubic inches.	16 cubic inches.



1. To make a box that will hold 4 cubic inches, draw a figure like this one. Cut out the corners, fold on dotted lines, and paste the square pieces cut from the corners over the joinings.
2. Make a box of paper, cardboard, or wood that will hold, when full:

5 cubic inches;	10 cubic inches;
6 cubic inches;	12 cubic inches;
8 cubic inches;	16 cubic inches;
9 cubic inches;	18 cubic inches.

1. A box is 3 inches long, 2 inches wide, and 2 inches high. How many cubic inches will it hold when full?
2. How wide is a box that contains eight cubic inches, and is two inches high and two inches long?
3. How long is a box that contains sixteen cubic inches, and is two inches wide and two inches high?
4. How high is a box that contains twelve cubic inches, and is two inches long and two inches wide?
5. A brick six inches long and four inches wide contains forty-eight cubic inches. How thick is it?
6. A bin is four feet long, two feet wide, and four feet high. How many cubic feet does it contain?
7. In a block of marble there are sixteen cubic feet. It is four feet long and two feet wide. How high is it?
8. A block is six inches long, four inches wide, and one inch thick. How many cubic inches are there in it?
9. How many cubic feet of air will a glass case hold that is five feet high, two feet wide, and two feet long?
10. How many cubic yards of air are there in a room that is 3 yards long, 2 yards wide, and 3 yards high?
11. A ditch is four feet wide and three feet deep. How many cubic feet are there in a part two feet long? How many in a part three feet long?
12. How many cubic feet will a wagon box hold that is 9 feet long, 4 feet wide, and 2 feet high?
13. How many cubic feet are there in a pile of wood four feet long, two feet wide, and two feet high?
14. How many cubic inches are there in a jewel-box 1 foot long, 4 inches wide, and 2 inches deep?
15. How many cubic feet in a play-house that is 5 feet long, 5 feet wide, and 5 feet high? In one that is 3 feet by 3 feet by 5 feet? How many cubic feet in the two houses together?

1. Review page 8 as oral work.
2. In a 5-gallon can, how many quarts are there? How many pints? How many gills?
3. A milk-man started in the morning with 100 quarts of milk. How many pints did he have? How many gallons?
4. There are 8 people in a family and each one drinks $\frac{1}{2}$ a pint of milk. How many pints must be bought? How many quarts?
5. From a jar containing 2 gallons of mineral water, 6 pints were taken. How many pints were left? How many quarts?
6. How many bottles holding 2 quarts each can be filled from 20 gallons?
7. A lamp burns a quart of oil every 24 hours. How many quarts must be bought to last 32 days? How many gallons?

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8. A milk-man had 176 quarts of milk. How many gallons did he have?
9. How many gill cups can be filled from 2 quarts and 1 pint of vinegar? From 5 gallons?
10. There are $31\frac{1}{2}$ gallons in a barrel. How many gallons are there in 4 barrels? In 6 barrels? In 8 barrels? 3 barrels? 5 barrels?
11. A barrel holds $31\frac{1}{2}$ gallons. How many quarts in it?
12. From a barrel of gasoline how many cans may be filled if each holds 3 quarts? How many if each holds $\frac{1}{2}$ a gallon? $1\frac{1}{2}$ gallon?
13. A milk-man starts in the morning with 48 gallons of milk. How many customers can he serve if each takes 3 quarts? How many, if each takes 2 quarts? If each takes 3 pints?

1. Review page 10 as oral work.
2. At 9¢ a peck, what will 2 bushels of oats cost?
3. What is 1 quart of beans worth if a peck is worth 72¢?
4. At $2 a peck, how many bushels of clover seed can be bought for $88?
5. A fruit dealer sold 3 pecks of nuts at 8¢ a quart. What did he receive for them?
6. A farmer picked 2 bushels of apples from one tree and 3 bushels from another. How many pecks did he pick from both together?
7. A grain bin holds 2 bushels. How many pecks do 7 such bins hold?
8. During the summer a boy picked 64 quarts of berries. How many pecks did he pick? How many bushels?

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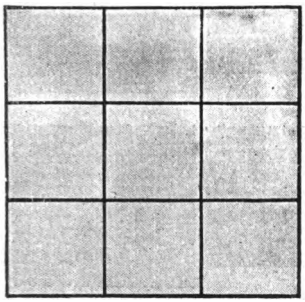
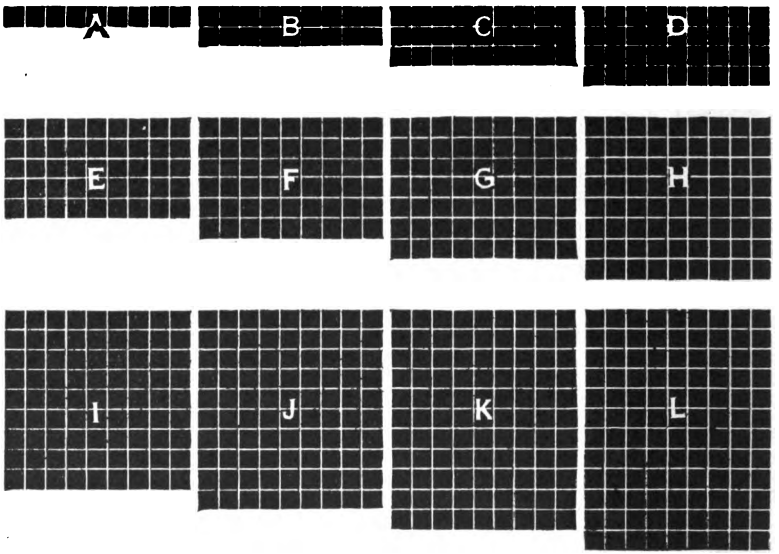
9. From a bushel of beans 2 quarts and 1 pint are taken. How many quarts are left?
10. How many pint boxes of cherries may be filled from a peck?
11. A man paid 60¢ for $1\frac{1}{2}$ bushels of apples. He sold them at 15¢ a peck. How much did he receive? How much did he gain?
12. 2 boys gathered 6 bushels of nuts. They sold $5\frac{1}{2}$ bushels by the peck. How many pecks did they sell? The remainder they sold by the quart. How many quarts did they sell?
13. A wheat bin holds 144 bushels. If 340 pecks are taken out, how many pecks remain? How many bushels?
14. A farmer gathers from his apple orchard 5 bushels per tree. There are 75 trees. How many bushels does he gather? If he packs them in barrels, 3 bushels to a barrel, how many barrels would he need? At $3 a barrel, how much will he receive?

1. How long will it take to travel 592 miles on a bicycle at the rate of 8 miles an hour?
2. A squirrel carried into a hollow tree 8 acorns every day. How many did he carry into the tree in 8 weeks?
3. Find the cost of 2 bushels 3 pints of cherries at 4¢ a pint.
4. What is the weight of 8 tubs of butter, each weighing $56\frac{1}{2}$ pounds?
5. What is the cost of 12 pecks, 3 quarts of peas at 8¢ a quart?
6. What is the cost of 8 sacks of barley, each weighing 112 pounds, at 8¢ a pound?
7. How many pints in 536 gallons? In 987 gallons?
8. How many quarts in 498 pecks? In 789 pecks? In 586 pecks? In 379 pecks?
9. How many months will it take a man to save $1,000 if he saves $8 a month?
10. How many pecks in 2768 quarts? In 7912 quarts? In 6856 quarts?
11. How many gallons in 4584 pints? In 9728 pints? In 8136 pints?
12. How long will a barrel of oil containing 504 pints last, if 8 pints are burned each week?
13. Find the weight of 8 barrels of oat meal, each containing 192 pounds.
14. A fruit-dealer bought 8 barrels of apples at $2 a barrel, each barrel containing 3 bushels. He sold them at $1 a bushel. How much did he get for them? How much did he gain?
15. Allowing 30 days to a month, how many days are there in 8 months?
16. A farmer had 420 bushels of wheat. He sold $\frac{1}{3}$ of it to one man and 304 pecks to another. How many bushels had he left?



1. Let $\frac{1}{2}$ inch in this figure stand for one foot. How many square feet does the whole figure stand for? What is the name for such a square?
2. How many square feet in a rectangle equal to two such squares? How many square yards?
3. How many square yards in 27 square feet?
4. How many square feet in 4 square yards? 5? 6? 7? 8?
5. How many square yards in a window 3 feet wide and 6 feet high?
6. How many square feet of plate glass are there in a store window 6 x 9 feet?
7. How many square yards of plastering are there on the walls of a room 18 feet wide, 24 feet long, and 12 feet high? How many square yards of ceiling in this room? How many square feet? How many square feet of tiling would it take to tile the floor?
8. How many dresses of 9 yards each, can Alice have made from 27 yards of cloth?
9. A hotel bought 9 gallons of milk each day in the week. How many gallons was that in a week? In 3 weeks? In 4 weeks?
10. At 10¢ a box, how many boxes of strawberries can be bought for 90¢?
11. Arnold earned 10¢ an hour, 9 hours a day, 6 days in the week. How much did he earn in one week? In 5 weeks?
12. A woman charged 9¢ an hour for sweeping offices. She worked from 7 o'clock in the morning until 5 in the evening, with an hour out for lunch. How much did she earn in a day? In a week? In 6 weeks?



1. How many squares in A? How many rows of 9 square spaces each in B? How many such squares in C? In D? E? F? G? H? I?
2. A equals 9. B equals 18. To what is C equal? D? E? F? G? H? I? J? K? L?
3. A equals what part of B? What part of C? Of D? E? F? G? H? I? J? K? L?
4. 9 equals what part of 18? What part of 27? Of 36? 45? 54? 63? 72? 81? 90? 99? 108?
5. B equals how many A's? What part of D? F? H? J? L?
6. 18 equals how many 9's? What part of 36? 54? 72? 90? 108?
7. C equals how many A's? What part of F? I? L?
8. 27 equals how many 9's? What part of 81? 108?

1. D equals how many A's? How many B's? What part of H? L?
2. 36 equals how many 9's? How many 18's? What part of 72? 108?
3. E equals how many A's? What part of J?
4. 45 equals how many 9's? What part of 90?
5. F equals how many A's? How many B's? How many C's? What part of L?
6. 54 equals how many 9's? How many 18's? How many 27's? What part of 108?
7. 63 equals how many 9's?
8. H equals how many A's? How many B's?
9. 72 equals how many 9's? How many 18's?
10. 81 equals how many 9's? How many 27's?

TABLE OF NINES.

9×1= 9	9×4=36	9×7=63	9×10= 90
9×2=18	9×5=45	9×8=72	9×11= 99
9×3=27	9×6=54	9×9=81	9×12=108

2	12	22
32	**9**	42
52	62	72

3	13	23
33	**9**	43
53	63	73

4	14	24
34	**9**	44
54	64	74

5	15	25
35	**9**	45
55	65	75

6	16	26
36	**9**	46
56	66	76

7	17	27
37	**9**	47
57	67	77

8	18	28
38	**9**	48
58	68	78

9	19	29
39	**9**	49
59	69	79

Add the heavy center number to each number in the same large square. Subtract it from each number larger than itself. Multiply and divide in the same way.

1. Add upward, downward, by lines to the right and to the left:

9	9	9	9	9	9	9	9	9
8	9	7	6	9	4	3	2	3
7	8	9	6	5	9	9	8	4
6	9	7	9	9	4	3	9	6
5	8	9	6	9	9	9	2	5
4	9	7	9	5	9	3	9	8
3	8	9	6	9	4	9	2	7
2	9	7	9	5	9	3	9	9
1	8	9	6	9	4	9	2	8

2. Add these numbers; subtract them; and multiply them:

47	68	45	89	93	77	90	64	99
9	9	9	9	9	9	9	9	9

39	88	92	46	80	209	398	768	908
9	9	9	9	9	9	9	9	9

3. Divide:

9)27	9)45	9)63	9)36	9)54	9)18
9)72	9)108	9)90	9)81	9)99	8)96

4. 27 equals how many 9's?
54 equals how many 9's?
63 equals how many 9's?
18 equals how many 9's?
72 equals how many 9's?
99 equals how many 9's?
45 equals how many 9's?
36 equals how many 9's?
81 equals how many 9's?
90 equals how many 9's?
108 equals how many 9's?
72 equals how many 8's?

1. 9 is $\frac{1}{4}$ of _____. 9 is $\frac{1}{6}$ of _____.
   9 is $\frac{1}{2}$ of _____. 9 is $\frac{1}{5}$ of _____.
   9 is $\frac{1}{8}$ of _____. 9 is $\frac{1}{3}$ of _____.
   9 is $\frac{1}{9}$ of _____. 9 is $\frac{1}{7}$ of _____.
   9 is $\frac{1}{10}$ of _____. 9 is $\frac{1}{12}$ of _____.
   9 is $\frac{1}{11}$ of _____. 8 is $\frac{1}{7}$ of _____.

2. How many 9's in 19? In 29?
   How many 9's in 48? In 56?
   How many 9's in 39? In 65?
   How many 9's in 76? In 109?
   How many 9's in 84? In 98?

3. At sight, name the sums:

5	6	7	8	9	4	8	7	7	5
4	7	8	9	3	9	6	7	9	9

5	6	9	8	7	6	5	7	4	3
3	7	5	6	8	9	4	6	9	9
2	3	4	4	6	5	6	9	8	7

10	41	22	53	84	75	36	67	98	59
6	6	6	6	6	6	6	6	6	6

4. At sight, name the differences:

12	15	18	17	19	16	29	25	28	29
4	6	4	6	5	4	9	3	7	10

24	26	28	26	27	25	23	28	27	29
13	12	15	14	16	14	11	15	13	16

21	22	23	24	25	27	28	26	25	24
9	6	7	8	6	9	8	9	7	6

1. What is the cost of 4 dozen eggs at 9¢ a dozen?
2. What is the cost of 6 feet of molding, if 9 feet cost 81¢?
3. How long will it take 1 man to do the work that 9 men can do in 11 days?
4. William earns one-ninth as much money as his father whose wages are $63 a month; how much does William earn a month?
5. In the front of a building there are 72 windows. In each story there are 9 windows; how many stories high is the building?
6. Jane's grandfather is 72 years of age, and Jane is one-ninth as old; in how many years will she be 17?
7. How much more than $36 should a man have in order to buy 9 tons of coal at $5 a ton?
8. There are 8 rows of seats in a school-room, and 9 seats in each row; how many seats in the room?

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9. Find the cost of 17 barrels of rice at $9 a barrel.
10. I had 9 dozen buttons and used 88 buttons. How many were left? How much did I pay for all of them at 6¢ a dozen?
11. A steamer sails 298 miles a day. How far will it sail in 9 days?
12. I bought 12 barrels of flour at $9 a barrel, and sold the flour for $95. How much did I lose?
13. At $158 an acre, what will 9 acres of land cost?
14. Alice has $11 and her father has 9 times as much and $8 more. How many dollars have both?
15. A certain line of telegraph costs $985 a mile. How much would 9 miles cost?
16. What is a man's income in 9 years at $2385 a year?
17. A gentleman earns $9 a day for 8 days, and spends $8 a day for 8 days. How much has he left?

1. How many square feet in a square yard?
2. A blackboard is 4 feet wide and 9 feet long. How many square feet in it? How many square yards?
3. Each window in a building contains 9 square feet. In 6 such windows there are how many square feet? How many square yards?
4. There are 9 shelves in a book-case; each one contains 12 books. How many books in the case?
5. One end of a desk is 9 feet from the wall, the other end is 7 feet from the opposite wall. The desk is 3 feet and 6 inches long. How far is it from one side of the room to the other?
6. A horse travels 6 miles an hour. How far will it go at the same rate, in 9 hours?
7. John has 83¢. How many 9¢ books can he buy, and how much money will he have left?
8. A boy pays 12¢ for 3 pencils. At the same rate what will 9 pencils cost?

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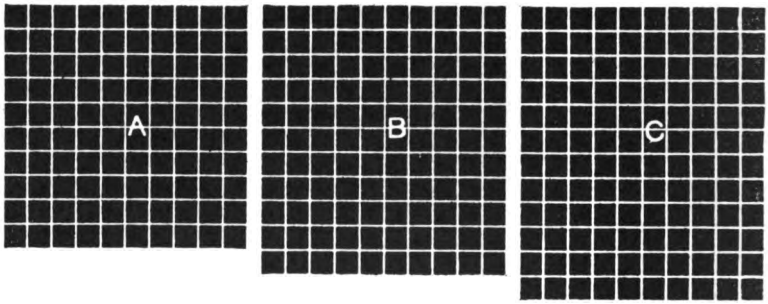
9. In each of 9 cars there are 57 persons. How many persons in the 9 cars?
10. There are 322 rails to the mile of railroad track. How many rails in 9 miles of track?
11. There are 9 equal lots fronting on a street 378 feet long. How wide is each lot?
12. A man owns 5 lots. The first is worth $1,929, the second $959, the third $1,195, the fourth $1,699, and the fifth $989. What is the value of the 5 lots?
13. A boy takes 9 subscriptions to the Youth's Companion at $1.75 each. How much money did he receive for them all?
14. A manufacturer sold 9 carriages at $195 each. How much did he get for them?

1. Review page 14 as oral work.
2. How many ounces are there in 1 pound? In 2 pounds? 3 pounds? 4 pounds? 6 pounds?
3. What part of 1 pound is 8 ounces? 4 ounces? 2 ounces? 12 ounces?
4. Which weight shown on this page equals $\frac{1}{2}$ a pound? Which one equals $\frac{1}{16}$ of a pound? Which $\frac{1}{4}$? Which $\frac{1}{8}$?
5. Which 2 weights together equal $\frac{3}{4}$ of a pound? Which 2 together $\frac{3}{8}$ of a pound?
6. The 8 ounce weight equals what part of 2 pounds? Of 3 pounds?
7. The 4 ounce weight equals what part of 2 pounds? Of 3 pounds?
8. The 8 ounce and the 4 ounce weight together equal what part of 2 pounds? Of 3 pounds?
9. How many pounds in a hundredweight?
10. How many hundredweights are there in 200 pounds? In 400 pounds?
11. How many pounds are there in $\frac{1}{2}$ of a hundredweight? $\frac{1}{4}$ of a hundredweight? $\frac{3}{4}$?
12. If a grocer has different weights, as shown in the picture, which ones will he use in weighing $\frac{3}{4}$ of a pound of tea? Which in weighing $\frac{3}{8}$ of a pound? $\frac{9}{16}$ of a pound? $\frac{3}{16}$? $\frac{1}{2}$? $\frac{5}{16}$? $\frac{1}{8}$? $\frac{1}{4}$? $\frac{1}{16}$? $\frac{11}{16}$? $\frac{5}{8}$? $\frac{15}{16}$? $\frac{7}{8}$? $\frac{13}{16}$?
13. Which different weights may he use in weighing $1\frac{1}{4}$ pounds of rice? In weighing $1\frac{7}{8}$ pounds? $1\frac{1}{8}$ pounds? $1\frac{1}{2}$ pounds? $1\frac{3}{4}$?

1. There are 60 pounds of wheat in 1 bushel. How many pounds in 9 bushels? In 7 bushels? In 5 bushels?
2. 1 hundredweight of metal costs $6. What will 50 pounds cost? 75 pounds? 25 pounds?
3. What is the postage at $\frac{1}{2}¢$ an ounce on a package weighing 4 ounces? On $1\frac{1}{2}$ pounds? On 3 pounds?
4. A bushel of oats weighs 32 pounds, how many pounds in a peck? In a quart? In 3 pecks?
5. A grocer weighs out $1\frac{1}{2}$ pounds of butter. What weights does he use? How many 4 ounce weights will he use to weigh $1\frac{1}{4}$ pounds? $\frac{3}{4}$ pound? 2 pounds?
6. Find the value of 4 pounds and 8 ounces of pepper at 20¢ a pound.
7. A grocer sells 8 packages of tea, each weighing 6 ounces; how many ounces do all weigh together? How many pounds?
8. A man bought 60 bags of flour, each weighing 5 pounds. How many hundredweights did he buy?
9. If a man buys old iron at $1\frac{1}{2}¢$ a pound, what will he pay for 24 pounds? For $\frac{1}{2}$ a hundredweight?
10. How many ounces are there in 9 pounds?
11. A farmer sold 6 tubs of butter averaging in weight $\frac{1}{2}$ a hundredweight each. How many pounds did he sell? How many ounces?
12. What is the weight in pounds of 3 packages, one weighing $2\frac{1}{2}$ pounds, one $\frac{1}{2}$ a pound and the other 3 pounds? What is the weight in ounces?
13. A man bought 3 packages of beans weighing 8 pounds each; he made them into 8-ounce packages. How many packages did he have?
14. A grocer sold $\frac{1}{8}$ of a pound of tea, $\frac{1}{2}$ a pound of butter, $\frac{3}{4}$ of a pound of coffee, and $1\frac{1}{2}$ pounds of sugar. How many ounces in the entire sale?



1. How many squares in one row of A? How many rows of 10 squares each in A? In B? In C?
2. How many 10's in 100? In 110? In 120?
3. 10 is what part of 20? Of 30? 40? 50? 60? 70? 80? 90? 100? 110? 120?
4. 20 equals how many 10's? What part of 40? 60? 80? 100? 120?
5. 30 equals how many 10's? What part of 60? 90? 120?
6. 40 equals how many 10's? 20's? What part of 80? 120?
7. 50 equals how many 10's? What part of 100?
8. 60 equals how many 10's? 20's? How many 30's? What part of 120?
9. 70 equals how many 10's?
10. 80 equals how many 10's'? 20's? How many 40's?
11. 90 equals how many 10's? How many 30's?
12. 100 equals how many 10's? 20's? How many 50's?
13. 110 equals how many 10's?
14. 120 equals how many 10's? 20's? How many 30's? 40's? 60's?
15. Name all the numbers to 100 that can be exactly divided by 10.
16. Count by 10's to 100. Each number you name has how many ones in the ones' column?

Table of Tens.

$10\times1=10$	$10\times4=40$	$10\times7=70$	$10\times10=100$
$10\times2=20$	$10\times5=50$	$10\times8=80$	$10\times11=110$
$10\times3=30$	$10\times6=60$	$10\times9=90$	$10\times12=120$

1. Add these numbers, subtract them, and multiply them:

12	15	23	30	36	42	47	53	59	61	68
10	10	10	10	10	10	10	10	10	10	10

74	79	80	83	88	91	98	87	58	67	99
10	10	10	10	10	10	10	10	10	10	10

2. Divide

10)30	10)50	10)46	10)60	10)75	10)29	10)80
10)67	10)90	10)38	10)100	10)99	10)110	10)120
4)40	5)50	9)90	10)76	12)120	11)110	8)80

2	12	22
32	**10**	42
52	62	72

3	13	23
33	**10**	43
53	63	73

4	14	24
34	**10**	44
54	64	74

5	15	25
35	**10**	45
55	65	75

6	16	26
36	**10**	46
56	66	76

7	17	27
37	**10**	47
57	67	77

8	18	28
38	**10**	48
58	68	78

9	19	29
39	**10**	49
59	69	79

Add the heavy center number to each number in the same large square. Subtract it from each number larger than itself. Multiply and divide in the same way.

1. Review page 16 as oral work.
2. Write one dollar as it is written in business.
3. In the same way write 2 dollars; 3 dollars; 5 dollars.
4. Write 50 cents in all the ways you can.
5. Write $1 and 50 cents. Without using the word "cents," how can you tell the cents from the dollars?
6. Write 2 dollars and twenty-five cents; 7 dollars and 10 cents; ten dollars and 75 cents; twelve dollars and fifteen cents.
7. Write $1 and 5 cents. Where should the 5 be written? Why? In what way should the first column to the right of the point be filled?
8. Write $8 and 9 cents; $3 and 1 cent; $17 and 6 cents.
9. When there are no cents how should the cents' columns be filled? What is the first cents' column to the right of the point? Write $1, five dimes and 1 cent. Read it.
10. Write $1 and 25 cents. Take away the dollar. What is left?
11. Write 25 cents as in problem 13. Write 17 cents; seventy-five cents; 4 cents; 40 cents.
12. Read:

$5.01	$9.10	$7.09	$10.20	$36.50	$30.03	$20.19
$8.02	$4.15	$9.13	$43.75	$84.62	$13.40	$12.05

13. Read, $.40, $.16, $.35, $.50, $.07, $.10, $.09.
14. Write in figures:

Nine dollars and twenty-five cents; forty dollars.
Twenty-six dollars and six cents; fourteen cents.
Ninety dollars and ninety cents; seven cents.
Thirty dollars and five cents; one hundred dollars.
Seventy-five dollars and seventy-five cents.
Eighty dollars and 9 cents.
Sixty-one dollars and 1 cent.

1. If a man works 10 hours a day, how many hours does he work in one week not including Sunday?
2. How many inches in 10 feet?
3. How many eggs in 10 dozen?
4. How many months in 10 years?
5. How many square feet in 1 square yard? In 10 square yards?
6. If there are 10 square feet of window glass in one window, how many in 8 windows?
7. Mr. Reed had 70 sheep. Wolves killed three-tenths of them. How many were left?
8. How many square inches in a 10 inch square?
9. How many marble tiles 1 foot square will be required to pave a hall that is 10 feet wide and 40 feet long?
10. How many square feet in the walls of a room that is 10 feet high and 10 feet square?
11. It is 6 miles to a village. A man goes and returns 5 days each week. How far does he travel in 1 week? In 3 weeks? 6 weeks? 10 weeks?
12. There are 10 rooms in a house. In each room there are 2 large pictures and 3 small ones. How many pictures are there in the house?
13. In one car each seat will hold 5 persons, in another 6 persons and in another 2. In each car there are 10 seats. How many persons may be seated in the 3 cars?
14. A train of 4 cars has in the first car 45 persons, in the second 54, in the third 65, in the fourth 59. How many persons are in the train?
15. A ten story building has 10 windows in each of the first 6 stories, and 8 windows in each of the remaining 4 stories. How many windows in the entire building?
16. A table is 10 feet long and $4\frac{1}{2}$ feet wide. What is its perimeter? Its area?

1. David had 3 Wyandotte hens, each of which laid an egg a day in March and April. How many eggs did he get from the 3 hens during those 2 months?
2. If he sold the eggs for setting at $1.50 per dozen, how much did David receive for the eggs in March and April?
3. Adele bought 5 geraniums at 15c each. She made 2 cuttings from each and potted all the plants. How many plants did she pot?
4. She sold all her geranium plants at 20c each. How much did she receive for them? How much did she gain?
5. A doll was dressed for a Christmas sale. Her underclothes cost 72c, her house dress 87c, her street dress $1.25, and her evening dress $1.40. The doll herself cost $1.25. What was the whole expense of making the doll ready for the sale?
6. This doll sold for $8.00. What was the gain?
7. Clara earned enough money to buy a ping-pong set by selling roses. She sold to 6 customers a half dozen each at the rate of $1.20 a dozen. How much did the ping-pong set cost?
8. Isabel saved her money and bought a pony for $40. Her father gave her a pony carriage which cost twice as much as the pony. How much did the whole outfit cost?
9. Caleb earned $72 in 4 weeks by driving an automobile. How much did he earn per week?
10. Richard ran his electric launch 48 miles in 6 hours. What rate was that per hour?
11. Robert worked in an electric supply house. He sold 9 electric light bulbs for $1.62. How much was that for each?
12. Mr. Goodwin worked in a berry-box factory. He made 966 boxes in 6 days. How many was that per day? At that rate how many could he make in 9 days?

1. Add:

$1.55	$9.76	$9.30	$25.71	$85.94
.08	3.72	12.10	20.04	57.38
4.50	1.31	17.68	47.37	19.99
5.17	7.75	24.33	.75	6.43
8.69	.87	9.77	8.10	.98

2. Subtract:

$56.29	$54.54	$13.74	$99.90	$107.60
15.25	24.32	7.55	93.24	89.25
$10.34	$45.32	$77.55	$321.76	$446.82
7.25	22.50	35.95	145.09	128.82

3. Multiply:

$2.63	$16.24	$37.58	$56.17	$10.29
2	3	4	5	5
$207.20	$450.75	$327.06	$525.50	$290.40
7	6	7	8	9

4. Divide:

2)$56.24	2)$38.56	3)$27.96	3)$45.21	4)$416.72
4)$892.64	5)$125.75	5)$530.50	6)$426.84	6)$558.72
7)$637.84	8)$968.72	8)$656.32	9)$468.63	

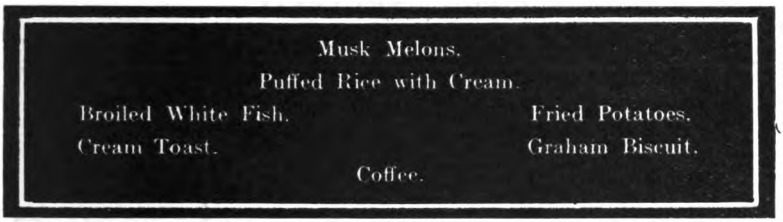
5. I bought a horse for $97.00, kept him at a livery stable for six months at $12.00 a month, and then sold him for $175.00. Did I gain or lose, and how much?
6. Mr. A. had $756.48. Mr. B had $327.16 and Mr. C. had $258.92. How much did they all have together?

1. What is the perimeter of an 11 inch square?
2. What is the area of an 11 inch square?
3. 3 loads of hay will winter one cow. How many cows will 33 loads winter?
4. How many inches in 3 feet? In 5 feet? 7 feet? 11 feet?
5. How many square inches in a rectangle that is 11 inches long and 3 inches wide? 11 inches long and 5 inches wide? 11 inches long and 7 inches wide? 11 inches long and 9 inches wide? 11 inches wide and 12 inches long?
6. How many days in 11 weeks and 4 days?
7. Find the cost of one-eleventh of 55 pounds of sugar at 6c a pound.
8. What is the cost of three-elevenths of 99 cords of wood at $5 a cord?
9. Find the cost of one-eleventh of 22 sheep at $7 each. Of three-elevenths at $9 each.
10. I paid $110 house rent and one-eleventh as much for gas. How much did I pay for both?
11. Isaac planted 88 seeds in 11 hills. How many seeds did he put in one hill?
12. How many square inches in the top of a mantel that is 11 inches wide and 48 inches long?
13. All but one-eleventh of $99 was divided among 3 people. How much did each receive?
14. How many feet of ribbon will be required to bind a portfolio that is 11 inches square, allowing 4 inches extra for corners? How many yards?
15. What is the perimeter of a rectangle 7 by 11 inches? What is its area?
16. It is 11 miles from A to B. How far will one travel in making 4 round trips?

1. Percy was sent away to school on the first of September. He came home for a short visit March first. How many months had he been at school? What part of a year?
2. Ben saved a dollar a month to pay for a watch costing $20. How many years and how many months over did it take him to save enough money?
3. Beatrice went to school 9 months in each year. How many months did she have vacation? What part of a year? What part of a year did she attend school?
4. Edward, who is $9\frac{1}{2}$ years old, is how many months old? His brother is 18 months younger than Edward. How old is his brother?
5. Rudolph bought 2 settings of a dozen eggs each at the rate of 5c for each egg. How much was that for a dozen? For both settings?
6. Sarah made fruit salad for a luncheon. She bought 18 oranges at 20c a dozen, 19 peaches at 36c a dozen, $\frac{1}{2}$ pound of white grapes at 24o a pound. The other articles necessary to make the salad amounted to 72c. What was the whole expense?
7. Sam raised 7 broods of 12 chickens each. In 4 broods all the chickens lived, in one only $\frac{1}{2}$ lived, in one $\frac{3}{4}$ lived and in one $\frac{2}{3}$ lived. How many from the 7 broods lived?
8. Amelia baked 5 dozen soda biscuits at an expense of 30c. She sold them at 10c a dozen. Find her gain.
9. Louise went with her mother to buy a new dress. They bought 12 yards of cloth at $1.25 a yard, 6 yards of lining at 12c a yard, 12 yards of trimming at 7c a yard, and $1\frac{1}{2}$ dozen buttons at 20c a dozen. What was the cost of the dress?
10. Richard earned $1\frac{1}{2}$c a box picking berries. He picked 12 boxes a day for a week. How much money did he earn in that way during the week?

1. Charles, George, and Stephen bought a fruit-stand. Charles paid one-half of the expense, George paid one-fourth. What part of the expense did Stephen pay?
2. The whole expense of buying the stand was $8.00. How many dollars did each boy pay?
3. They bought 10 dozen oranges at $.20 a dozen, 4 pecks of apples at one dollar a bushel and 15 dozen lemons at $.20 a dozen. How much did the fruit cost? The stand and all the fruit?
4. They sold the oranges at $.40 a dozen. How much money did they get for them?
5. How much profit or gain did they make on the oranges?
6. They sold 8 dozen lemons at $.25 a dozen and 7 dozen at $.30 a dozen. How much money did they get for the lemons?
7. How much profit or gain did they make on the lemons?
8. They sold the apples at $.40 a peck. How much money did they get for the apples?
9. How much profit or gain did they make on the apples?
10. How much profit did they make on all of the fruit?
11. They used half of their gain in making a larger stand. How much money did they use in this way?
12. How much money did they have left to invest in more fruit?
13. How much would they gain at the same cost and price on 10 dozen oranges? On 15 dozen lemons?
14. How much would they gain from selling:
    5 dozen oranges at 5c apiece?
    4 dozen lemons at 5c apiece?
    6 pecks of apples at 60c a peck?
15. If the boys had divided the gain equally among themselves after problem 10, instead of investing in more fruit, how much would each have received?

Elizabeth and Sarah went to cooking-school. They learned to make this breakfast for 8 persons and to find its cost.



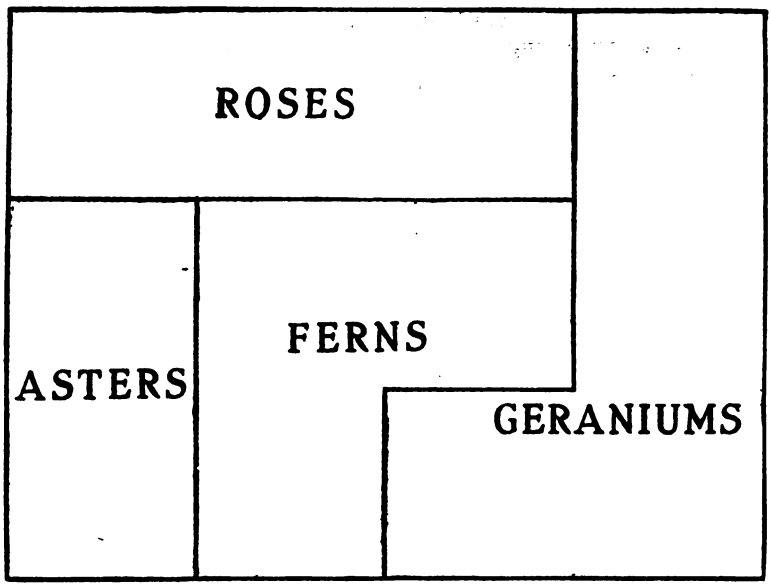
They used 4 melons at 7¢ each, 5 pounds of fruit at 12¢ a pound, ½ package of puffed rice at 10¢ a package, 1 quart of potatoes at 16¢ a peck, a half of a loaf of bread at 5¢ a loaf, 2 pints of cream at 18½¢ a pint, 10 tablespoonfuls of coffee (in all ⅛ of a pound) at 40¢ a pound, 1 dozen Graham biscuits at 10¢ a dozen, 1½ pounds of butter at 28¢ a pound, salt, pepper, and lard, amounting to 5¢, and enough fuel to cost 10 cents.

1. What was the cost of each kind of food? Of the whole breakfast? For each person? What would be the cost of this breakfast omitting the melons? Omitting the cream toast?
2. Guy's father took him to a restaurant, where they ordered as follows:

   2 orders of asparagus soup at 15¢ each.
   2 orders of fresh mackerel at 20¢ each.
   1 order of roast lamb with peas, 35¢.
   1 order of small steak, 45¢.
   2 orders new potatoes with cream sauce at 15¢ each.
   1 order cucumber salad with wafers, 20¢.
   1 order lemon ice with lady fingers, 15¢.
   1 order vanilla ice cream, 10¢.
   2 orders American cheese with hard crackers, 15¢ each.
   2 orders coffee at 10¢ each.

   What was their bill?

   Dividing the bill equally, give the cost for each person.



This is the plan of a garden in which 1 inch stands for 12 feet.

1. Find in feet the length of the garden. The width. The perimeter.
2. Find in feet the perimeter of the space given to asters; to roses; to ferns, to geraniums.
3. How many 12-foot squares are used for asters? For roses? For ferns? For geraniums? For the whole garden?
4. There are gravel walks on the division lines between the parts and around the whole garden. How many feet of gravel walk are there around the asters? The roses? The ferns? The geraniums? How many feet of gravel walk around the whole garden?

1. The space given to asters is how many feet long? How many feet wide? How many square feet does it contain?
2. The space given to roses is how many feet long? How many feet wide? How many square feet does it contain?
3. A 12-foot square contains how many square feet?
4. The space given to ferns contains how many 12-foot squares?
5. The space given to ferns contains how many square feet?
6. The space given to geraniums contains how many 12-foot squares? How many square feet?
7. Add the number of square feet given to the different kinds of flowers. How many square feet in the whole garden?
8. A 3-wire fence 36 feet long extends along the side of the rose garden. How many feet of wire were used? How many yards?
9. In the geranium garden there are 7 rows of Martha Washingtons with 15 plants in each row, 12 rows of rose-geraniums with 12 plants in each row, 9 rows of skeleton geraniums with 18 plants in each row, and 12 rows of scarlet geraniums with 12 plants in each row. How many plants are in this garden?
10. A gardener is paid $36 per month. How much is that per week?
11. The gardener hires a boy to help him 2 days in the week, at 10 cents an hour, 6 hours a day. How much does the boy earn?
12. The plants in the geranium garden were bought at wholesale and were 10 cents each. How much did they all cost?
13. The asters were of 5 kinds: yellow, pink, white, shaggy, and mixed. There were 9 rows of each kind with 12 plants in each row. How many plants were in the aster garden?

1. 4 gallons of molasses at $.22 a quart cost how much?
2. At $.03 a foot, what will 4 yards of picture-molding cost?
3. At $.60 a bushel, what will 5 pecks of potatoes cost?
4. At $.15 an hour, how long will it take a boy to earn $3.00?
5. At $.18 a dozen, what will 6 dozen eggs cost?
6. At $.26 a pound, what will 24 ounces of butter cost?
7. How many hours from 9:30 A. M. to 6:30 P. M.?
8. A rectangle 4 feet by 9 feet contains how many square feet? How many square yards?
9. How many yards of hall carpet will it take to carpet a hall 15 feet long and wide enough for but one strip?
10. How many strips of carpet 1 yard wide will it take to carpet a room 18 feet wide?
11. How many yards long must a strip be to be laid lengthwise if it is to reach from wall to wall of a room 21 feet long?
12. If a room is 18 feet wide and 21 feet long, how many yards of carpet a yard wide will be needed to carpet it?
13. At $.50 a yard, what will the carpeting of such a room cost?
14. How many minutes between 11:15 A. M. and 3:45 P. M.?
15. At 4 cents a quart, how many pints of berries can you buy for 40 cents?
16. At $.02 each morning, how much will the daily paper cost for March of this year?
17. At 7 cents a yard, what will be the cost of three bunches of braid, each containing 5 yards?
18. A boy bought 20 evening papers for $.15 and sold them for 1 cent each. How much did he get for them? What was his gain?
19. How many persons paid cash fares if a street-car conductor collected $4.50 in 5-cent fares?
20. At three for $1, how many tennis balls can be bought for $7?

1. Thirty marbles at 6¢ a dozen cost how much?
2. Six tablets at 2 for 15¢ cost how much?
3. At six for 5¢, how many oranges can you buy for a quarter-dollar? For 75¢?
4. At 6 for 10¢, how many oranges can you buy for 60¢? For $1?
5. At 40¢ a yard, what is the cost of $2\frac{1}{8}$ yards of ribbon? Of 6 yards? Of $6\frac{1}{4}$ yards?
6. At the same price, what is the cost of $6\frac{3}{4}$ yards? Of $\frac{3}{8}$ of a yard?
7. Andrew kept an account of what he had saved and what he earned in March and April. He earned $.15 a day from his paper route, 5¢ a day for carrying a lunch-basket 7 days in the week, 15¢ a week for keeping the cellar clean, and $.40 a week for mowing the lawn.

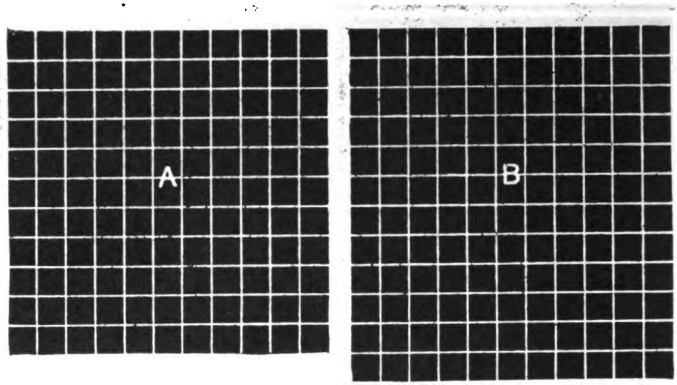
(a) How much did he earn each week by carrying papers?
(b) How much did he earn each week by carrying lunch 7 days?
(c) How much did he earn a week from all these things?
(d) Counting 4 weeks to a month, how much did he earn each month?
(e) How much did he earn in the 2 months by carrying papers? By carrying lunch? Counting 4 weeks to each month, how much did he earn by cleaning the cellar? By mowing the lawn?
(f) Andrew spent 3 cents a day for car-fare, and $.10 a day for lunch. How much had he left each week?
(g) At the end of the two months he bought a 5-dollar watch and a rake costing $1.25. How much money did he spend? How much had he left from the earnings of the 2 months? Add what he had left to $5 and find how many weeks he could pay for his lunch with it.

Hickory Nut Cake.	White Cake.
2 cups sugar (1 lb.)	½ cup butter (¼ lb.)
1 cup butter (½ lb.)	1 cup sugar (½ lb.)
4 eggs, beaten separately	½ cup sweet milk (¼ pint)
4 cups flour (2 lb.)	1¾ cups flour (1⅜ lb. or 4¢)
3 teaspoonfuls baking powder (1¢)	3 teaspoonfuls baking powder (1¢)
1 cup milk (½ pt.)	Whites of 4 eggs
1 quart hickory nuts (1 lb. shelled)	1 teaspoonful vanilla (1¢)

1. For the hickory nut cake, find the cost of the following:
   Sugar at 6¢ a pound;
   Butter at 24¢ a pound;
   Eggs at 18¢ a dozen;
   Flour at 2½¢ a pound;
   Baking powder as given in the rule;
   Milk at 3¢ a pint;
   Hickory nuts at 30¢ a pound, shelled.
2. Counting the fuel at 3¢, find the cost of making this cake.
3. For the white cake, find the cost of the following:
   Butter at 22¢ a pound;
   Sugar at 5¢ a pound;
   Milk at 4¢ a pint;
   Flour at 4¢;
   Baking powder and vanilla as given in the rule;
   Eggs at 24¢ a dozen.
4. Counting the fuel at 2¢, find the cost of making this cake.
5. If the two cakes were placed in the oven at the same time, what would be the difference in the cost of the fuel?
6. Mrs. Moore made 2 hickory nut cakes and 3 white cakes to sell. Besides the expense of the materials, she charged 50¢ for the work of making each cake. How much did she receive for 1 hickory nut cake? For 1 white cake? For all the cakes she sold?
7. How much more did she receive for the 3 white cakes than for the 2 hickory nut cakes?

Fudges.	Nut Sugar Candy.
3 cups granulated sugar (1½ lb.) 1¼ cups milk (¾ pint) 1 two-inch square of chocolate (3¢) Butter the size of a walnut (½¢) (Allow ½¢ for fuel)	1 cup granulated sugar (½ lb.) 2 cups brown sugar (1 lb.) Butter the size of a walnut (1¢) ½ cup cream (¼ pint) ½ lb. shelled English walnuts (Allow 1¢ for fuel)

1. Find the cost of the fudges, counting the sugar at 6¢ a pound, the milk at 2¢ for ¾ pt., the chocolate, butter, and fuel as in the rule. This will make 3 dozen fudges.
2. Jessie and Ethel made fudges, using this rule. They sold the fudges at 1¢ each. How much did they receive?
3. Marion used double this fudge rule at Christmas time. How many fudges did she make. How much did they cost her?
4. If fudges were made by this rule and sold at 15¢ a dozen, what would be the gain?
5. If a half pound of shelled hickory nuts at 60¢ a pound were added to the rule for fudges, what would be the cost of making the fudges?
6. Find the cost of the nut candy, counting the granulated sugar at 6¢ a pound, the brown sugar at 4¢ a pound, the cream at 20¢ a pint, the shelled English walnuts at 60¢ a pound, and the butter and fuel as given in the rule.
7. This rule makes 5 dozen thick squares of nut candy. If they sell at 2¢ a square, what is the gain on the whole?
8. Edwin made 3 times the nut candy rule. What was the expense? He sold the squares at 10¢ a dozen. How much did he receive for them? What was his gain?
9. Lena wanted to earn some Christmas money. She made twice the nut candy rule and 3 times the fudge rule. What did it cost her? She sold all the fudges at 2¢ each. How much did she receive for them? How much did she gain? She sold all the nut candy at 3¢ a square. How much did she receive for it? How much did she gain?



1. How many square spaces in one row of A? How many rows of 11 square spaces each in A? In B?
2. How many 11's in A? In B?
3. 11 equals what part of 22? Of 33? 44? 55? 66? 77? 88? 99? 110? 121? 132?
4. 22 equals how many 11's? What part of 44? 66? 88? 110? 132?
5. 33 equals how many 11's? What part of 66? 99? 132?
6. 44 equals how many 11's? How many 22's? What part of 88? 132?
7. 55 equals how many 11's? What part of 110?
8. 66 equals how many 11's? How many 22's? 33's? What part of 132?
9. 77 equals how many 11's?
10. 88 equals how many 11's? How many 22's? 44's?
11. 99 equals how many 11's? How many 33's?
12. 110 equals how many 11's? How many 55's?
13. 121 equals how many 11's?
14. 132 equals how many 11's? How many 22's? 44's? 66's?
15. Count by 11's to 132.
16. Compare the number of ones with the number of tens in each number you have just expressed.

TABLE OF ELEVENS.

11×1=11	11×4=44	11×7=77	11×10=110
11×2=22	11×5=55	11×8=88	11×11=121
11×3=33	11×6=66	11×9=99	11×12=132

1. Add these numbers; subtract them; multiply them:

39	45	50	23	47	56	73	65	89	29	99
11	11	11	11	11	11	11	11	11	11	11

2. Divide:

11)33 11)55 11)77 11)23 11)44 11)66 11)59

3. Measure off and mark $5\frac{1}{2}$ yards on the floor. How many steps are there in $5\frac{1}{2}$ yards?
4. This distance, $5\frac{1}{2}$ yards, is a rod.
5. How many rods in 11 yards? In 22 yards? In 33 yards? In 44 yards?
6. How many are 2 times $5\frac{1}{2}$? 3 times $5\frac{1}{2}$? 4 times $5\frac{1}{2}$?

2	12	22
32	‖	42
52	62	72

3	13	23
33	‖	43
53	63	73

4	14	24
34	‖	44
54	64	74

5	15	25
35	‖	45
55	65	75

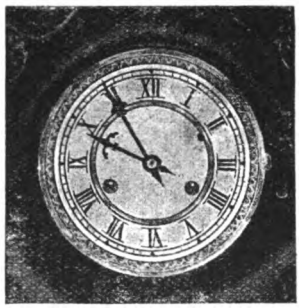
6	16	26
36	‖	46
56	66	76

7	17	27
37	‖	47
57	67	77

8	18	28
38	‖	48
58	68	78

9	19	29
39	‖	49
59	69	79

Add the heavy center number to each number in the same large square. Subtract it from each number larger than itself. Multiply and divide in the same way.



Draw the face of a clock, using the Roman numerals. Cut the hands from stiff paper or cardboard and color them with ink. Fasten them to the face of the clock with a pin.

1. Show on the clock when it is twenty minutes to one; 10 minutes to 3; 5 minutes after 5; 7 minutes to 12.
2. Show these times in the order given: Eight thirty; eight forty-five; nine fifteen; ten ten; twelve fifteen.
3. Show these times: 1:45; 6:50; 3:20; 7:40; 2:37; 4:00.
4. What time is it when
   (a) the minute hand is at 4, the hour hand nearest 2?
   (b) the minute hand is at 12, the hour hand at 3?
   (c) the minute hand is at 5, the hour hand nearest 1?
   (d) the minute hand is at 9, the hour hand nearest 12?
5. Show on the clock what time you have breakfast; luncheon; dinner.
6. Show the time when school opens; when recess comes; when school closes.
7. Show the time when the sun rises at this time of year. The time when the sun sets.
8. Show the time of meeting of the class you like best.
9. Show the time when your grocery opens.
10. Add:

426	842	846	627	985
389	683	726	829	286
725	782	875	846	297

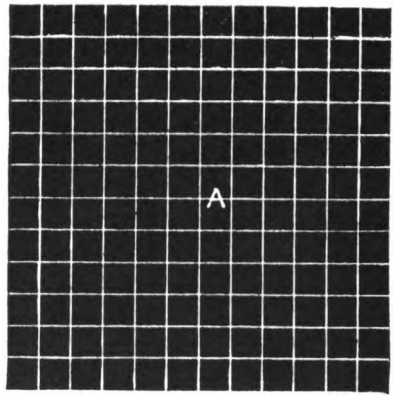
Subtract:

407	572	672	862	307
296	359	343	559	196

1. What is the second month? Fifth month? Ninth month? Sixth month? Eighth month? Eleventh month?
2. Learn the order of the months by number and name.
3. How many days in all of the months containing 31 days? How many days in all the months containing 30 days?
4. How many days in January? April? March? February? June? August? September? July? October? November? December?
5. How many days in the first 3 months of the year? In the last 3 months of the year?
6. How many days in the first 6 months of the year? In the last 6 months of the year?
7. How many days difference between the first 6 months and the last 6 months of the year?
8. How many days in February, March, and April together?
9. In April, May and June together?
10. In July and August together?
11. In September, October and November together?
12. A man left home in the morning the first day of April and returned home in the evening the last day of July. How many days was he away from home?
13. How many days in the first, third, fifth, seventh, and eighth months together?

NAMES AND ABBREVIATIONS OF THE MONTHS OF THE YEAR IN ORDER, AND NUMBER OF DAYS IN EACH.

No.	Month.	Abbrev.	No. of Days.	No.	Month.	Abbrev.	No. of Days.
1	January..	Jan.	31	7	July.....	.....	31
2	February .	Feb.	28 (29)	8	August. ...	Aug.	31
3	March ...	Mar.	31	9	September.	Sept.	30
4	April	Apr.	30	10	October ...	Oct.	31
5	May	.....	31	11	November	Nov.	30
6	June.	.....	30	12	December	Dec.	31



1. How many square spaces in one row of A?
2. How many rows of 12 squares each in A?
3. How many squares in all of A?
4. 12 equals what part of 24? Of 36? 48? 60? 72? 84? 96? 108? 120? 132? 144?
5. 24 equals how many 12's? What part of 48? 72? 96? 120? 144?
6. 36 equals how many 12's? What part of 72? 108? 144?
7. 48 equals how many 12's? How many 24's? What part of 96? 144?
8. 60 equals how many 12's? What part of 120?
9. 72 equals how many 12's? How many 24's? 36's? What part of 144?
10. 84 equals how many 12's?
11. 96 equals how many 12's? How many 24's? 48's?
12. 108 equals how many 12's? How many 36's?
13. 120 equals how many 12's? How many 24's?
14. 132 equals how many 12's?
15. 144 equals how many 12's? How many 24's? 36's? 48's? 72's?

Table of Twelves.

12×1=12	12×4=48	12×7= 84	12×10=120
12×2=24	12×5=60	12×8= 96	12×11=132
12×3=36	12×6=72	12×9=108	12×12=144

1. Add these numbers; subtract them; and multiply them:

28	53	45	33	48	57	74	66	90	38	99
12	12	12	12	12	12	12	12	12	12	12
67	89	78	49	96	50	87	29	82	59	88
12	12	12	12	12	12	12	12	12	12	12

2. Divide:

12)36 12)60 12)72 12)28 12)49 12)56 12)66

12)71 12)108 12)99 12)120 12)84 12)144 12)132

3. 4 × 9 = ? 5 × 9 = ? 36 × 6 = ? 72 × 12 = ?
8 × 7 = ? 3 × 12 = ? 49 × 7 = ? 88 × 8 = ?

2	12	22
32	**12**	42
52	62	72

3	13	23
33	**12**	43
53	63	73

4	14	24
34	**12**	44
54	64	74

5	15	25
35	**12**	45
55	65	75

6	16	26
36	**12**	46
56	66	76

7	17	27
37	**12**	47
57	67	77

8	18	28
38	**12**	48
58	68	78

9	19	29
39	**12**	49
59	69	79

Add the heavy center number to each number in the same large square. Subtract it from each number larger than itself. Multiply and divide in the same way.

1 hour	1 day	1 week	1 year
60 minutes	24 hours	7 days	365 days
			52 weeks
			12 months

1. How many minutes in 1 hour? In 2 hours? 3 hours? 5 hours? 8 hours? One half an hour? One-fourth of an hour? Three-fourths of an hour?
2. What part of an hour are 10 minutes? 30 minutes? 45 minutes? 15 minutes?
3. How many hours in a week?
4. How many weeks in 147 days?
5. A boy is 8 years and 4 months old. How many months old is he?
6. The train leaves the station at 8.05. It is a 12 minutes' walk to the station. At what time must one start in order to catch the train?
7. A boy leaves home at 7.30 each morning and returns from work at 6.15 in the evening. How long is he away from home? How long is he away in 6 days?
8. A train leaves the station at 7.15 and arrives in the city at 7.42 in the morning. Returning, it leaves the city in the evening at 5.40 and arrives at 6.11. How long does a man spend on the train who goes back and forth each day for 10 days?
9. A boy leaves home for school at 8.35 and reaches the school room at 2 minutes before 9. He returns home for lunch at noon, taking the same time on the way each trip. How long is he on the way in 1 day? In 5 days?
10. School begins at 9 o'clock and dismisses at 15 minutes before 12; opens at 1.30 and closes at 3.45. How long is the forenoon session? How long is the afternoon session? How long are both together?
11. If 15 minutes were allowed for recess both morning and afternoon, how long would the sessions be together?

1. Review pages 18 and 19 as oral work.
2. How many months old is a boy who is 7 years old? How many weeks old is one who is 11 months old?
3. How many months old is a boy who is 11 years old? 12 years old?
4. How many weeks in 6 months?
5. How many minutes in one-half a day?
6. How many minutes from 7.15 a. m. to 8 o'clock a. m.?
7. How many minutes from 8 o'clock p. m. to 9.15 p. m.?
8. How many hours from 5 in the morning until 9 at night?
9. A boy goes to bed at 9 o'clock and gets up at 6. How long is he in bed?
10. A boy plays ball in the morning from 7 until 9, and in the afternoon from 4 until 6. How many hours does he play?
11. A train leaves Chicago at 9 o'clock in the morning and arrives in Cincinnati at 6 in the evening. How many hours is it on the way?
12. A train leaves Chicago at 10.30 in the morning and reaches Buffalo at 12.20 at night. How many hours is it on the way?
13. A train leaves Washington at 9 o'clock in the morning, and reaches New York at 2.15 in the afternoon. How many hours is it on the way?
14. A train leaves Toledo at 4.30 p. m., reaches Cleveland at 9.10 p. m., and Buffalo at 2.40 a. m. How long is it on the way from Toledo to Cleveland? How long from Toledo to Buffalo?
15. A boat leaves Chicago at 8.30 in the morning, reaches Milwaukee at 11.30, and leaving Milwaukee at 6.15 in the evening, reaches Chicago at 9.15. How many hours does it take to make the round trip? How many hours from the time the boat leaves Chicago until it returns?

1. Review pages 21, 51, 61, and 111 as oral work.
2. Albert is $5\frac{1}{2}$ years old. Edwin is 18 months older than Albert. How old is Edwin? What is the difference in years and parts of a year?
3. Mr. Walker gave his grandson, Willard, \$5 to put in the bank each year of his life. How much had Willard put in the bank when he was 5 years old? 7? 12?
4. Lyman ran a mile in 10 minutes. John walked the same distance in a quarter hour. It took John how many minutes longer than Lyman? How many seconds?
5. A golf-player hired a caddy who worked for him 3 hours and 20 minutes, at the rate of 15 cents an hour. How much did the caddy receive?
6. Gerald earned \$5 picking strawberries at the rate of 10 cents an hour. How many hours did he work?
7. Arthur, Harold, and Burton rented a boat for 6 hours for \$1.20. How much was that per hour? The boys divided the expense equally. How much did each pay?
8. Paul and Herbert ran an automobile at the rate of 96 miles in 12 hours. How much was that per hour?
9. A carrier pigeon flew a distance of 560 miles in 7 hours. How far was that per hour? At this rate, how far could the pigeon fly in 5 hours? In 12 hours?
10. Wallace drove to his grandfather's, a distance of 90 miles, in 12 hours. How far was that per hour?
11. Willie took a 5-hour steamboat ride, and in that time traveled 90 miles. How far was that per mile?
12. Frank and Willis ran a race. Frank ran a mile in 7 minutes. Willis ran the same distance in 12 minutes. The difference is what part of an hour?
13. Paul's hat fell into the river and 6 hours later was found 42 miles farther down the river. How fast was the river flowing?

1. Frank and David had an animal show one month. They had 12 guinea pigs, 12 white mice, 7 rabbits, 6 pigeons, 5 dogs, and a pony. How many animals had they?
2. It cost them 55 cents a day for feed for the animals. How much was that for a week? For 6 weeks?
3. They had the show in a lot, a part of which they fenced off. This enclosed space was 20 feet long and 12 feet wide. What was its area?
4. The pony was taught to walk a flat board which ran around the top of the fence. How far did he walk in going around it once?
5. The pony walked around the lot on the board 5 times in 3 minutes. How many feet was that per minute?
6. There were three performances each day. The morning one lasted from 8:45 to 9:30. How long was it?
7. The admission to the morning performance was 3 cents, to the afternoon performance 5 cents, and to the evening performance 7 cents. The first day of the show 8 persons attended in the morning, 7 in the afternoon, and 12 in the evening. What did the boys receive during that day? How much had they left after subtracting the price of the feed for the animals?
8. The boys hired a phonograph for evening performances, at 2 cents a night. How much did it cost in a week of 6 days? Counting the phonograph and the food, what were their expenses for 4 weeks?
9. One of the dogs was taught to jump from the top of a ladder 28 feet high. At equal distances on this ladder were platforms. The first was $\frac{1}{4}$ of the way up. How many feet from the ground was it? How many feet from the ground was the second platform? The third? How many feet between the first and third platforms?

WRITING AND READING NUMBERS.

1. 0, 1, 2, 3, 4, 5, 6, 7, 8, 9
2. How many different characters are given above?
   All numbers, no matter how large, may be represented by these figures.
3. 243
   Reading the 3 alone we say 3 ones. Reading the 4 alone we say 40 or 4 tens. Reading the 2 alone we say 200 or 2 hundreds.
4. If we were to write above each figure a separate name it would appear:

Hundreds.	Tens.	Ones.
2	4	3

   But if we were to call these all ones, we would read it as 243 ones or units.
5. How would you read 3,243?
6. This new figure, 3, placed before the other number, we call thousands. How then would you read 10,243?
7. Large numbers are divided into *periods* of 3 places each, beginning with ones. Thus 243 is one period. 3,243 has 2 periods. These periods are separated by commas, for convenience, as follows:

	Ones		
Thousands.	Hundreds.	Tens.	Ones.
9,	4	5	6

8. How many periods in the following numbers? Separate the periods by commas:
   346 4684 26 3781 1032

1. Read the following numbers, pointing off periods:

5784	8752	9872	6375	7365
3586	7678	6498	8988	8989
2987	5425	5674	7988	6543

2. Write the following numbers, with ones in the right hand column, with tens, hundreds and thousands in their columns as shown on the opposite page:

Seventeen. Two hundred twenty-seven. One hundred seven.

Thirty-one. Three hundred twelve. One hundred.

Sixty-eight. Sixty hundred eighty. Nine hundred.

One thousand. Eleven thousand. Eight hundred.

One thousand two hundred. Six hundred twenty-five.

One thousand sixty. Two hundred seventy-five.

One thousand six hundred fifty. One hundred seven.

One thousand ten. One thousand one hundred.

Five thousand six hundred fifty-five. Nine hundred.

Three thousand three hundred. Seventy-five.

Three thousand thirty. Four hundred twenty-five.

Six thousand six. Eight hundred seventy-nine.

3. Write in words or read from the page:

125	683	1200	4816	5090
307	469	3049	1010	9847
590	303	5060	5064	3005
483	791	2009	3100	4200

4. In writing numbers for addition and subtraction, it is more convenient to place ones underneath ones, tens under tens, hundreds under hundreds, etc.

5. Write for addition the following numbers:

640, 35, 1282, 6, 821, 64, 8, 2305

6. Write the following for subtraction:

From 872 take 6. From 6475 take 242. From 3684 take 27.

Measure of Length.

1. Review page 3 as oral work.
2. Measure off distances of 1 in., 1 ft., 1 yd., 1 rd.
3. Robert repaired two rods of fence for his father. How many yards was that? How many feet?
4. Susan had a hat which measured $1\frac{1}{2}$ yards around the rim. At the back of rim was a knot of ribbon. The hat blew off and rolled on its rim down the street. Susan counted the number of times it turned by the marks of the knot of ribbon in the dust. There were nine marks. How many yards did her hat roll?

TABLE.

1 rd. = $16\frac{1}{2}$ ft. = $5\frac{1}{2}$ yds.
1 yd. = 3 ft.
1 ft. = 12 in.

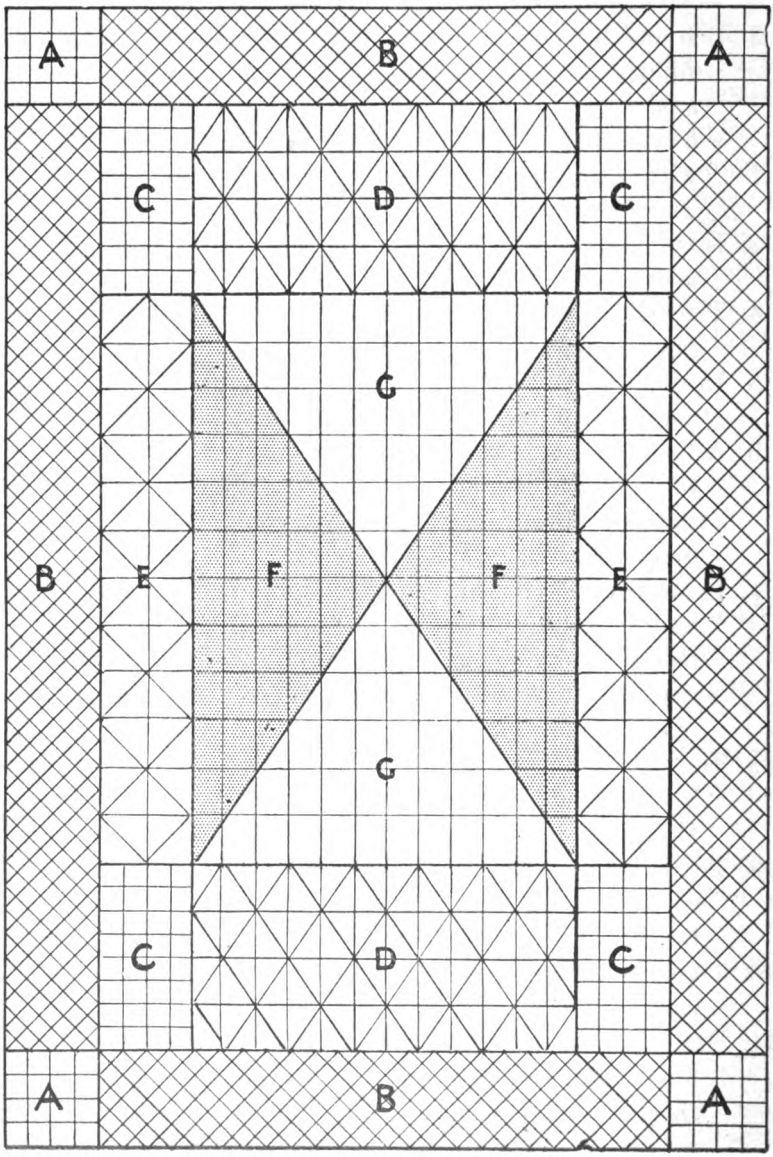
Surface Measure.

5. Review pages 5, 53, and 81 as oral work.
6. On page 81, what does the drawing represent? To what scale is it drawn? Using paper and ruler, measure off and cut out a square yard. Divide into square feet and cut again.
7. Divide each side of your square foot of paper into inches by placing points. How many inches are there on each side? Connect exactly opposite points by drawing straight lines, dividing the square foot with square spaces. Each space has what area? How many square inches in 1 row? In all the rows? How many square inches in one square foot?

TABLE.

1 sq. yd. = 9 sq. ft.
1 sq. ft. = 144 sq. in

1. Review pages 51, 83, 107, and 111 as oral work.
2. Ben and Richard were given a box of tools for Christmas. Among the tools were a foot ruler, a yard-stick, and a long tape-measure. Their father allowed them to have a vacant lot for a play-yard. They fenced the lot with wire, using 80 feet of wire to go around it once. The lot was 20 feet wide. How long was it?
3. How many yards long was the lot? How many yards wide?
4. The boys made a 3-wire fence. How many feet of wire did they use?
5. In making the fence they first placed posts at the corners and every 5 feet between. How many posts were used?
6. A line 1 rod long was drawn from the middle of one side through the middle of the field to divide it into 2 equal spaces. How many yards long was the line? How many feet?
7. In one corner of the lot the boys built a workshop. It was built against the corner of the fence and extended 9 feet along one side of the lot and 6 feet along the adjoining side. What was the area of the floor? How many square yards in it?
8. The workshop was 7 feet high. How many square feet in each side wall? Each end wall? All the walls? How many square yards in all the walls?
9. There were 2 windows in the shop. One had 2 panes, each 12 by 15 inches, and the other 4 panes 10 by 12 inches. How many square inches of glass were used?
10. The door was 6 feet high and 3 feet wide. How many square yards of space did it fill?
11. Under a tree in one end of the lot the boys built a bench 6 feet long and 18 inches wide. What was the area of the top of the bench?


A
B
A
C
D
C
G
B
E
F
F
E
B
G
C
D
C
A
B
A

1. Page 120 shows a scale drawing of one inch to 2 ft. It is the picture of the tiling in a small hall. How long is the hall? How wide is it?
2. The expense of tiling the 4 corners, A, was $1.80. How much was that per square foot?
3. The cost of tiling the outside border on the north, B (without the corners), was $2.40. How much was that per square foot? At that rate, what was the cost of tiling the whole outside border, B?
4. The expense of tiling the corners, C, was $1.30 for each. How much was that per square foot? How much was it for the 4 corners?
5. How many square feet in D? In the 2 D's?
6. At 55 cents a square foot, how much did it cost to tile D? The 2 D's?
7. The cost of tiling one inside border, E, was $2.88. How much was that per square foot?
8. At the same rate, what did the 2 E's cost?
9. What is the area of F? Of G?
10. The cost of tiling F was $2.70. How much was that per square foot? At that rate, what was the cost of tiling the 2 F's?
11. The cost of tiling G was $3.12. How much was that per square foot? At that rate, what did it cost to tile the 2 G's?
12. What was the expense of tiling the 2 F's and the 2 G's together?
13. What was the expense of tiling the 2 E's, the 2 D's, and the 4 C's?
14. What was the cost of tiling the entire outside border, counting the corners?
15. What was the cost of tiling this whole hall?
16. How many square feet in the hall?

Liquid Measure.

1. Review pages 8, 9, and 67 as oral work.
2. Dorothy bought for the Christmas baking, 3 quarts of molasses, at 12¢ a quart; 2 quarts of maple syrup, at 22¢ a quart; 2 quarts of cream, at 20¢ a quart; ½ gallon of cherry vinegar, at 22¢ a gallon; and 3 pints of milk, at 6 cents a quart. What was her bill?
3. Amelia made 4 gallons of lemonade for a picnic. She sold it in pint glasses, at 5 cents a glass. How much did she receive for it?
4. Willis sold 9 gallons of milk at 6 cents a quart. How much did he receive for it?
5. Walter bought a gallon pail. He carried it full 31½ times to fill a barrel. How many gallons did it take?

TABLE.

1 barrel (bbl.) = 31½ gal.
1 gal. = 4 qt.
1 qt. = 2 pt.

Dry Measure.

6. Review pages 10 and 11 and 67 as oral work.
7. Anderson shelled 50 bushels of corn a day for 6 days. How many bushels did he shell in the week? How many pecks?
8. James picked 7 pecks of tomatoes for his grandmother to can. How many quarts was that?
9. Archie gathered 5 bushels of apples from the ground in his father's orchard. How many pecks was that?
10. If they sold at 50 cents a peck, how much money did he receive for them?

TABLE.

1 bu. = 4 pk.
1 pk. = 8 qt.
1 qt. = 2 pt.

1. There were 3 crews of 8 oars each in a boat race. How many men rowed in the race?
2. An ocean liner crossed the Atlantic in 8 days. How many trips of that length could it make from August first to September second?
3. In an art gallery were 32 oil paintings and $\frac{1}{4}$ as many etchings. How many etchings and paintings were in the gallery?
4. Amanda hired a pony carriage in the park at 8 cents an hour. She kept it $2\frac{1}{2}$ hours. What did she pay for it?
5. Amelia sold 4 dozen paper roses at 2 cents each. How much did she receive?

6. Add:

279	372	782	372	687
684	698	698	987	249
726	496	726	684	872
842	891	982	928	698

7. Subtract:

407	598	326	682	721
316	499	197	598	129

8. Multiply:

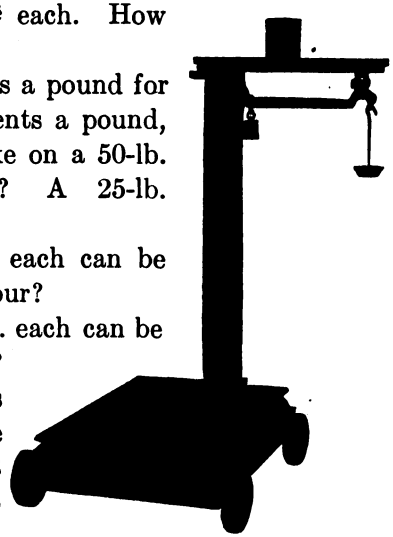
4872 × 4	8649 × 8	7642 × 4	8347 × 8
17563 × 4	38765 × 3	12643 × 3	6498 × 4

9. Divide:

4)7205	8)6723	4)1062	8)2046
2)13716	4)26718	8)19464	2)11356

1. Review pages 14 and 15 as oral work.
2. How many 2-oz. packages of cinnamon can be made from 1 lb. of cinnamon?
3. How many 4-oz. packages of ginger can be made from 5 lbs. of ginger?
4. What is the cost of a 2-oz. package of pepper at 40 cents a pound?
5. How many ounces in $\frac{1}{2}$ pound? In $\frac{1}{4}$ lb.? In $\frac{1}{8}$ lb.? In $\frac{3}{4}$ lb.? In $\frac{7}{8}$ lb.?
6. What will 4 oz. salted almonds cost at 60 cents a pound?
7. What will 12 oz. caramels cost at 32 cents a pound?
8. What will 9 oz. spices cost at 48 cents a pound?
9. What will 12 oz. cheese cost at 16 cents a pound?
10. A grocer bought 25 lb. tomatoes at 3 cents a pound, sold 15 lb. at 5 cents a lb., 7 lb. at 3 cents a pound, and the rest spoiled. How much did he make on the tomatoes?
11. A dealer bought 50 lbs. coffee at 26 cents a pound. He divided it into 1-lb. sacks and sold it all at 35 cents a sack. If the sacks cost $\frac{1}{8}$ of a cent apiece, how much did he make on the coffee?
12. Find the total cost of 8 lb. candy at 35 cents a pound, and of 12 lb. of nuts at 12 cents a pound?
13. Find the total cost of this bill:
    3 lb. butter at 27 cents a pound.
    5 lb. honey at 18 cents a pound.
    7 lb. beefsteak at 14 cents a pound.
    25 lb. flour at 4 cents a pound.
    4 lb. cheese at $11\frac{1}{2}$ cents a pound.
14. Find the total cost of this bill:
    4 oz. cloves at 60 cents a pound.
    2 oz. pepper at 48 cents a pound.
    12 oz. cheese at 12 cents a pound.
    4 lb. crackers at 6 cents a pound.

1. How many 5-lb. sacks of salt are there in a 300-lb. barrel of salt?
2. A grocer paid $2.40 for a 300-lb. barrel of salt and sold it out in 5-lb. sacks at 5¢ each. How much did he make?
3. If a grocer pays 2½ cents a pound for flour and sells it at 4 cents a pound, how much does he make on a 50-lb. sack? A 100-lb. sack? A 25-lb. sack?
4. How many sacks of 50 lb. each can be made from 525 lbs. of flour?
5. How many sacks of 5 lbs. each can be made from 280 lb. of salt?
6. A bushel of potatoes weighs 60 pounds. What is the weight of 6 bushels? 8 bushels? 12 bushels? 25 bushels? 36 bushels?



7. A bushel of shelled corn weighs 56 pounds. How much do 4 bushels weigh? 9 bushels? 12 bushels? 16 bushels? 28 bushels?
8. The persons in a picnic party of 6 people weighed 178 lb., 136 lbs., 125 lbs., 82 lbs., and 64 lbs. How much did the whole party weigh? What is the difference between the weights of the heaviest and the lightest persons?
9. If the total weight of a party of 12 persons was 1200 lbs. and all persons were of the same weight, what was the weight of a single person (average weight of a person)?
10. Find the average weight of a person of the party of problem 8?

5 / 1	3	11 / 6
12	2	10
4 / 9	2	7 / 8

Figure A

5 / 1	9	8 / 2
3	35	10
12 / 6	4	7 / 11

Figure B

1. Multiply each number in the outside spaces of Fig. A by the center number.
2. Change the center number in Fig. A to:
   5; 3; 7; 6; 4; 8; 9; 12; 11; 10.
3. Each time the center number is changed, multiply all the other numbers by it.
4. Divide the center number in Fig. B by each of the other numbers. When there is any remainder, name it, also.
5. Change the center number to:
   21; 24; 28; 36; 42; 44; 45; 48; 60; 54; 56; 64; 65; 66; 72; 81; 88; 90; 96; 100; 121; 132; 108; 144.
6. Each time the center number is changed, divide each of the other numbers by it.
7. How many 2's in 6? 8? 10? 12? 24? 50? 56? 90? 124? 132? 144?
8. How many 3's in 9? 15? 21? 33? 39?
9. How many 4's in 8? 12? 24? 16? 32? 20?
10. How many 5's in 25? 20? 60? 45? 35?
11. How many 6's in 18? 12? 24? 42? 48? 66? 72? 54?
12. How many 7's in 35? 49? 21? 14? 63? 42? 70?
13. How many 8's in 16? 32? 48? 64? 24? 40? 56?

Find the cost of:

1. 3 dozen eggs at 18 cents a dozen.
2. 5 dozen oranges at 25 cents a dozen.
3. 4 dozen lemons at 20 cents a dozen.
4. 6 dozen bananas at 22 cents a dozen.
5. 2 dozen tablets at 9 cents a tablet.
6. 7 dozen pencils at 35 cents a dozen.
7. 8 dozen buttons at 27 cents a dozen.
8. 12 dozen candles at 10 cents a dozen.
9. 10 dozen spools of cotton at 50 cents a dozen.
10. 11 dozen spools of silk at 90 cents a dozen.
11. 15 dozen erasers at 25 cents a dozen.
12. 14 dozen pairs of scissors at $1.80 a dozen.
13. 13 dozen pairs of stockings at $1.50 a dozen.
14. 16 dozen pairs of suspenders at $1.25 a dozen.
15. 19 dozen pens at 5 cents for each pen.
16. 17 dozen bottles of ink at 3 cents a bottle.
17. 18 dozen bags of salt at 5 cents a bag.
18. 12 dozen tooth-brushes at $1.60 a dozen.
19. 10 dozen bottles tooth-powder at $1.00 a dozen.
20. 15 dozen pears at 30 cents a dozen.
21. 8 dozen pretzels at 8 cents a dozen.
22. 16 dozen loaves of bread at $.05 a loaf.
23. 19 dozen foot-rules at 1 cent apiece.
24. 14 dozen blotters at 5 cents a dozen.
25. 15 dozen pieces of dustless crayon at 10 cents a dozen.
26. 18 dozen tubes of paste at 50 cents a dozen.
27. 13 dozen bottles of glue at $1.00 a dozen.
28. 9 dozen boxes baking powder at 15 cents a box.
29. 8 dozen jars preserved ginger at 25 cents a jar.
30. 4 dozen photo frames at 10 cents each.
31. 15 dozen papers of pins at 5 cents a paper.
32. 11 dozen papers hooks and eyes at 5 cents a paper.

1. Review pages 28 and 29 as oral work.
2. Of the school children in a certain city 3,495 are boys and 2,837 are girls. What is the total school attendance?

   3,495 girls
   2,837 boys
   6,332 total

   7 and 5 are 12, = 1 ten and 2 units. Write the 2 units. Then, 1 ten and 3 tens and 9 tens are 13 tens, = 1 hundred and 3 tens. Write the 3 tens.

   Continue in this way till all numbers are added.

   Show how the last two figures, the 3 and the 6, are found in the total.

   Read the total.
3. In a town there are 1676 grown persons and 2475 children. How many people are there in this town?
4. In one library there are 3528 books, and in another, 4695 books. How many in both libraries?
5. There are 5374 miles of railroad in one state and 2868 miles in another. How many miles of railroad in both states?
6. In one year a fruit grower sold 3448 boxes of berries and 3976 boxes the next year. How many boxes of berries did he sell during those two years?
7. A man bought a lot for $2,350 and built a house on it which cost him $7,898. What did both cost him?
8. Add:

2037	8226	4587	1284	7431	3368	3643
4256	975	3624	7536	1869	4852	5892
4768	3579	1928	4536	5948	6384	7463
1359	2468	3746	2879	3726	1597	1859
5762	3478	6712	4726	8721	6975	6721
3498	7842	6721	3497	6829	8982	9762

1. Four loads of coal were delivered at a residence. The first weighed 2564 pounds, the second 3148 pounds, the third 2866 pounds and the fourth 2645 pounds. What was the total weight of coal delivered?

THE WAY WE ADD.

2564 lb.
3148 lb.
2866 lb.
2645 lb.
11223 lb.

5 (and 6), **11,** (and 8), **19,** (and 4), **23,** = 2 tens and 3 units. Write 3, as shown. Then, 2 (and 4), **6,** (and 6), **12,** (and 4), **16,** (and 6), **22**; 22 tens are 2 hundreds and 2 tens. Write the 2 tens. Then 2 (and 6), **8,** (and 8), **16,** and so on.

In adding we speak only the numbers outside the (•). Check, or test, the correctness of your addition by adding the columns from the top downward.

2. How can you prove your result in problem 1? Why should you *always* prove your results in addition?
3. A man had 5 farms. In the first there were 160 acres, in the second 88 acres, in the third 275 acres, in the fourth 96 acres and in the fifth 324 acres. How many acres are there in the five farms?
4. There are 375 pupils in one school building, 640 in another and 583 in another. How many children are there in the three buildings?
5. Add and test your results:

1729	3546	1892	1563	2623	1089	2703
2354	1273	4203	2427	1206	721	3145
4162	2098	461	5314	4257	5147	605
1431	1754	2574	256	1714	2425	2804
947	6126	1245	4678	6924	3987	3004
2753	825	3256	963	728	4058	289
1388	1268	1367	2837	1256	874	1452
5234	1834	2765	1234	473	1498	3257

1. A man paid $2684 for a house, $398 for furniture and $265 for a horse and carriage. How much did he pay for all?
2. A lot cost $1540, the sidewalk $116, the house $6535, the barn $975. How much did they all cost?
3. A ship sailed 234 miles the first day, 275 miles the second day, and the third day as far as in the first two. How far did it sail in the three days?
4. Three vessels are loaded with copper. The first carries 347 tons, the second 1256 tons, the third 4384 tons. How many tons do they all carry?
5. From Detroit to Buffalo it is 251 miles; from Buffalo to New York City 410 miles; from New York to Washington, D. C., 228 miles. How far is it from Detroit to New York City? From Detroit to Washington by way of New York City?
6. From Burlington to Omaha it is 296 miles; from Omaha to Lincoln 39 miles; from Lincoln to Denver, 484 miles. How far is it from Burlington to Lincoln? From Burlington to Denver?
7. From Milwaukee to La Crosse it is 281 miles; from La Crosse to St. Paul, 131 miles; from St. Paul to Minneapolis, 10 miles. How far is it from Milwaukee to Minneapolis?
8. From Omaha to Cheyenne is 516 miles; from Cheyenne to Ogden, 484 miles; from Ogden to Sacramento, 743 miles. How far is it from Omaha to Sacramento?
9. How far is it from the town where you live to the capital of your state? From the town where you live to Washington, D. C.? From your home town to San Francisco?
10. Using the distances found in railway time tables, make and solve problems like those above.
11. Using the scale of miles given on a map, make and solve problems like those above.

1. A man has 156 books in one case, 275 in another and in a third 145 more than in both of the others. How many books has he in the 3 cases?
2. A factory made 540 bicycles in January; 375 in February; 643 in March, and 856 in April. How many did it make in the 4 months?
3. A man delivered 4 loads of coal. In the first were 2150 pounds; in the second, 1975 pounds; in the third, 2260 pounds, and in the fourth, 2315 pounds. How many pounds were delivered in the 4 loads?
4. A carpenter was paid $1375.50 for building one house; $3240.75 for another; $1658.50 for a third. How much did he receive for building the 3 houses?
5. The cash sales of a certain merchant were on Monday, $253.25; Tuesday, $167.54; Wednesday, $365.80; Thursday, $453.65; Friday, $385.42, and on Saturday, $563.85. What were the cash sales for the week?
6. A man bought a lot for $2154. He paid $453 for grading and digging a cellar, and $165.40 for a sidewalk. He built a house to cost the same amount that he had spent for the lot and all improvements. How much did he invest in the lot and house?
7. A man's salary was $2300 a year. He also received $135 interest, $426 rents, and from all other sources a sum equal to these three amounts. What was his annual income?
8. The yield from one field of wheat was 275 bushels; from a second, $562\frac{1}{2}$ bushels; from a third, 458 bushels, and from a fourth, $346\frac{1}{2}$ bushels. What was the entire yield from the 4 fields?
9. From A to B is 416 feet and 6 inches; from B to C, 375 feet; from C to D, 456 feet and 6 inches. How far is it from A to D?

SCHOOL SUPPLIES.

Box paper, per box	$0.35	Crayon pencils, each	$0.10
Pen tablet, each	.15	Colored pencils, each	.10
Envelopes, package	.05	Ink, small bottle	.05
Pencil tablet, small, each	.03	Erasers, each, 1¢, 3¢, or	.05
Pencil tablet, large, each	.05	Brass edged rulers, each	.05
Penholder, each	.05	Note-books, thick, each	.10
Pens, per doz.	.10	Paper fasteners, per doz.	.05
Pencils, soft, each	.01	Note-book covers, small, each	.15
Pencils, medium, each	.03	Note-book covers, large, each	.25
Pencils, hard, each	.05	Pencil sharpeners, each	.05

ALICE SMALL,
Pleasantville, Ohio.

1 Box of Paper	$0.35
1 Pencil Tablet	.05
1 Hard Pencil	.05
1 Eraser	.03
1 Brass Edged Ruler	.05
1 Small Book Cover	.15

1. Alice bought a box of paper, a pencil tablet, a hard pencil, an eraser, a brass edged ruler, and a small note-book cover. How much did she spend?
2. Charles bought three colored pencils, a bottle of ink, a thick note-book, a penholder, two dozen pens, two soft pencils, and a pencil tablet. How much did he spend?
3. Harry bought two packages of envelopes, three five-cent pencil tablets, 2 pen tablets, 2 pencils of each kind, a 5-cent eraser, and a brass-edged ruler. He gave the clerk a dollar. How much change was due him?
4. William bought a large note-book cover, a pencil sharpener, 2 dozen paper fasteners, 4 medium pencils, a 5-cent eraser, 2 pen tablets. He gave the clerk one dollar. What was the correct change?
5. At prices given in the above list, how much would it cost to supply a school of 45 children each with the following: a pen tablet; two 3-cent pencil tablets; a penholder; a dozen pens; 2 soft pencils, and a brass-edged ruler?
6. Make problems supplying a number of pupils in your school with some of the articles in the list.

PRICES OF FURNITURE.

Metal bedstead	$18.00	Refrigerator	$ 9.65
Dresser	14.00	Bedroom stand	4.00
Wash-stand	8.00	Dressing-table	10.50
Rocker	5.50	Shaving-stand	15.00
Davenport	55.00	Hall chair	3.00
Bookcase	15.00	Stiff-backed chair	3.00
Small desk	12.50	Armchair	6.50
Combination desk and bookcase	33.00	Foot rest	2.50
Morris chair	15.00	Large desk	50.00
Quarter-sawed oak dining-table	29.75	Wicker rocker	4.00
Dining-room chair	3.95	Polished topped stand	12.50
Kitchen table	3.00	Sideboard	45.00
		Small range	25.00
		Spice chest	1.00

1. At the prices given in this list, what is the cost of furnishing a kitchen with a small range, a kitchen table, a refrigerator, and a spice chest?
2. Find the cost of a quarter-sawed oak dining-table, a sideboard and 6 dining-room chairs.
3. Find the cost of furnishing a room with a metal bedstead, a dresser, a washstand, a polished topped stand, a stiff-backed chair, and 2 common rockers.
4. Find the cost of furnishing a room with a metal bedstead, a shaving-stand, a dresser, a bedroom stand, a rocker, a stiff-backed chair, and a foot rest.
5. Find the cost of furnishing a room with a metal bedstead, a dressing-table, a small desk, a rocker, and a stiff-backed chair.
6. Find the cost of furnishing for a living-room a davenport, a Morris chair, 2 wicker rockers, 2 common rockers, 2 stiff-backed chairs, a foot rest, a bookcase, a large desk, and a polished topped stand.
7. Find the cost of buying for a house 2 metal bedsteads, 2 dressers, a shaving-stand, a dressing-table, 4 rockers, a Morris chair, and a davenport.
8. Furnish rooms as you wish and find the cost of furnishing.

1. A horse traveled 7 miles an hour the first hour of a journey, 6 miles an hour the next 2 hours, and 5 miles an hour the next 5 hours. How many hours did he travel? How far did he travel in that time?
2. A man walked 4 miles an hour for 3 hours, 5 miles the next hour, and 3 miles an hour the next two hours. How many hours did he travel? How far did he travel in that time?
3. In an automobile race one of the racers ran his car 90 miles an hour for 6 hours and 95 miles an hour for 6 hours. What distance did he travel in the 12 hours?
4. A grizzly bear traveled 11 miles 1 day, twice as far the next day, one-half as far the third day as the second. How far did he travel in the 3 days?
5. A boy rode on his bicycle 10 miles the first hour, the same distance and 5 miles more the second hour, which was three-fourths of what he rode the third hour. How far did he ride the second hour? The third? In the three hours?
6. A special train made the following runs: The first hour 28 miles; the second hour 8 miles farther than the first; the third hour two-thirds as far as the second, and the fourth hour 40 miles. How far did it run the second hour? The third? In the 4 hours?
7. In a large city factory there are 28 persons working on the first floor, one-half that number on the second floor, 4 times as many on the third as on the first floor, one-half as many on the fourth as on the third, and 30 on the fifth. Make a list of the number of persons on each floor. How many persons on the 5 floors?
8. In a small library there were 78 science books, one-half as many histories and 3 times as many story books as science books. How many books were in the library?

1. Joseph paid $18 for a spring suit, two-thirds as much for an overcoat, one-ninth as much for a hat as for the suit, and one-sixth as much for 2 shirts as for the suit. How much did the overcoat cost? The hat? The 2 shirts? How much money did he spend in all?
2. Alice paid $12 for a new coat, one-half as much for a skirt, one-third as much for a hat as for the coat, one-fourth as much for a pair of shoes as for the coat, and one-third as much as the shoes cost for a new pair of gloves. How much did the skirt cost? The hat? The shoes? The gloves? How much did Alice spend in all?
3. Julian spent 20 cents for shoe-polish, one-fourth of a dollar for a tooth-brush, three-fourths as much for soap as for polish, and twice as much for a hair-brush as for a tooth-brush. How much did the tooth-brush cost? The soap? The shoe-polish? The hair-brush? How much did Julian spend in all?
4. Andrew bought a leather cap for 50 cents, a fishing-rod for one-half as much, a pair of rubber boots for 4 times as much as for the cap, a fish-basket for 3 times as much as the cap cost, and a can of bait for 15 cents. How much did the fishing-rod cost? The rubber boots? The fish-basket? How much money did he spend altogether?
5. Herman bought the following:

   5 packages of petunia seed at 5 cents a package.
   2 packages giant pansy seed at 20 cents a package.
   ½ pound of nasturtium seed at 10 cents an ounce.
   1½ ounces of canary bird vine seed at 14 cents an ounce.
   4 packages of aster seed at 10 cents a package.
   3 packages of sweet-william seed at 8 cents a package.
   6 packages of columbine seed at 10 cents a package.

   What was his bill?

1. Review pages 33 and 34.
2. A man paid $425 for one horse and $246 for another. How much more did one horse cost than the other?

From $425	6 from 15 leaves what?
take 246	4 from 11 leaves what?
$???	2 from 3 leaves what?

3. The walls and ceilings of one room contain 444 square feet; those of a second room contain 159 square feet less. How many square feet in the second room?

From	444 square feet	Explain how each figure of the difference is found.
take	159 " "	
	??? " "	

4. A gentleman's salary is $2650 a year; if his expenses for the same time are $2075, how much does he save in one year? Test.
5. If one ship sails 645 miles in 3 days, and another sails 712 miles in the same time, how much farther does the second sail than the first? At the same rate, how much farther would it sail in one day? In 9 days?
6. 223 − 144 = ?
7. 201 − 178 = ?
8. 542 − 263 = ?
9. 831 − 548 = ?
10. 362 − 279 = ?
11. 666 − 177 = ?
12. 975 − 887 = ?
13. 274 − 187 = ?
14. 902 − 873 = ?
15. 777 − 188 = ?
16. 864 − 579 = ?
17. 743 − 654 = ?
18. On Tuesday a merchant placed in the bank $465. On Saturday he drew out $278. How much did he still have in the bank? Test.
19. At an election the successful candidate received 913 votes, and the unsuccessful candidate 658 votes. Find the majority of the former. Test.
20. Find the difference between one year and 287 days.
21. A cistern holds 235 barrels of water when full. It now contains 178 barrels. How many more barrels will it hold?

1. Subtract 4586 from 6352.

From	$^{5,12,4,12}6352$
Subtract	4586

The small numbers written above the figures of 6352 show how to think 6352 into parts to subtract 4586 from it. The numbers mean that 52 is 40 + 12, then 34 = 20 and 14, and 62 = 50 and 12.

2.

From	$^{6,12,16,14}7374$
Subtract	4687
	2687

Tell where the 14 above the 4 comes from; the 16 above the 7; the 12; the 6.

3. Solve in the way you *like the better:*

Subtract:

4352	6234	8132	9457	5321	3324	7563
2676	1395	5786	3869	1867	1657	2786
8967	8241	7241	7294	7182	9256	6842
3429	3819	398	5076	3647	7498	3715
7586	6493	4250	8593	5721	5345	5765
3248	4729	1575	7279	3809	2675	3629
4792	6820	8901	7002	6840	7080	8200
3489	5761	6820	6111	3471	4121	6712
4802	3768	8421	6704	8782	6818	2176
4000	3200	300	6110	4010	3720	617
3007	4800	3000	3710	6704	6070	4000
2060	2170	2210	2000	3078	307	2099

1. A tank that holds 3324 gallons lacks 1576 gallons of being full. How many gallons does it contain?

   From 3324, *minuend,*
   take 1576, *subtrahend.*
   1748, *difference* or *remainder.*

   Explain how each figure of the difference is found.

2. One year a grocer sold 17,206 dozen eggs and the next year 21,119 dozen. How many more dozens did he sell the second year than the first?

3. Find the unknown number and test the result in each case:

	Minuend.	Subtrahend.	Difference or Remainder.
(a)	3211	2933	?
(b)	7235	6856	?
(c)	?	5945	869
(d)	85,004	25,687	?
(e)	62,130	38,685	?
(f)	?	91,617	76,928

4. During the year 1897, 2321 immigrants went to live in Louisiana and 1872 went to live in Texas. How many more went to Louisiana than to Texas?

5. The battleship New York takes the place of 8200 tons of water when it is afloat; the battleship Texas, of 6315 tons. How much more water does one ship displace than the other?

6. The coast line of North America is 24,040 miles; that of South America, 13,600 miles; and that of Europe, 17,200 miles. How many more miles of coast line has North America than South America? North America than Europe? Europe than South America?

7. In 1896, 6511 horses were brought into this country from British North America; in 1897, 4777. How many more were brought in in 1896 than in 1897?

1. From a farm containing 1100 acres, the owner sold 894 acres. How many acres had he left?
2. The area of Virginia is 42,450 square miles; of Pennsylvania 45,315 square miles. Which is the larger? How much?
3. A farm cost $3215. The buildings cost $627 less than the farm. How much did the buildings cost?
4. Subtract and test each result:

(1)	(2)	(3)	(4)	(5)	(6)
4352	8132	9457	5321	6234	9257
2672	5786	3869	1867	1395	6389
(7)	(8)	(9)	(10)	(11)	(12)
3324	7563	7241	9256	8200	2354
1657	2786	2398	7498	6712	1876
(13)	(14)	(15)	(16)	(17)	(18)
4250	4060	3006	4523	3132	7345
1575	2099	2217	2657	1854	5868
(19)	(20)	(21)	(22)	(23)	(24)
6352	9374	7374	5432	8513	5345
4576	4687	4687	1845	6729	2678

5. One railroad has 5214 miles of track; another has 2767 miles of track. How much more track has the first than the second?
6. A gentleman's income one year was $1985 and the next year it was $2140. How much greater was his income the second year?
7. Two vessels start from the same point at the same time and in the same direction. The one travels 829 miles while the second is traveling 1014 miles. How far are they apart?

1. A slow river flows 15,840 feet an hour. A rapid river flows 36,960 feet in an hour. What is the difference in the distances covered by the two in one hour?
2. A carriage was bought for $325, a horse for $175, and a sleigh for $150. A payment of $125 was made on the carriage, a payment of $112 on the horse, and a payment of $56 on the sleigh. How much was there left to pay on the carriage? The horse? The sleigh? On all?
3. Subtract:

4,726	8,092	8,294	6,826	4,072
3,987	7,963	7,982	5,982	3,987
67,829	68,750	83,607	96,702	89,020
39,879	58,792	59,879	69,892	84,948
67,000	82,020	80,980	71,000	10,101
59,811	72,919	25,751	36,987	9,899
47,020	36,072	78,987	60,507	98,572
39,891	32,697	58,999	57,251	95,989

4. From the beginning of the Mississippi River to the Gulf of Mexico the water travels 4,200 miles. The Amazon River is 3,600 miles long. How much longer is the Mississippi than the Amazon?
5. One car contains 35,352 pounds of coal, another contains 26,475 pounds. How much more does the first contain than the second?
6. How many persons are there in the capital city of your state? How many persons in the capital city of some adjoining state? Find the difference in the population (number of persons) of these two states.
7. Make problems similar to 6, using the population of other states and of cities.

1. Ellen earned 90 cents and spent 35 cents and a dime. How much had she left?
2. Edward bought a $1.35 football and gave the clerk a 2-dollar bill. How much change did he receive?
3. Mary's mother gave her 85 cents. She bought a 10-cent tablet and a 25-cent book-cover. How much money had she left?
4. Fred received $1.27 selling papers. He had to expend $.92 for new papers. How much did he gain?
5. A picture was bought for $92.00 and sold for $125.00. How much did the owner gain?
6. A horse that was bought for $118 was sold for $138. What was the gain?
7. Butter was selling at 42 cents, but was reduced or cut in price 7 cents a pound. What was then the selling price?
8. A cow was bought for $47 and sold for $34. What was the loss?
9. A man's wages were raised from $1.25 to $1.85 a day. What was the gain in 1 day? In 1 week of 6 days?
10. What was the gain of this man in 4 weeks? What was the gain in 2 months?
11. His expenses were $1.00 per day. How much did he save a day after his advance?
12. How much did he save in a week? In 4 weeks?
13. From a field containing 78 sheep, 14 were taken at one time, 10 at another, and twice 9 were taken. How many sheep were left in the field?
14. A boy was given $5 for car-fare for 3 months. The first month his car-fare amounted to 99 cents; the second month to $1.05, and the third month to $2.07. How much had he left of the $5?
15. Out of 107 rose bushes set out, 18 died and 29 were pulled up. How many were left to grow?

1. Review page 37.
2. If a man earns 27 cents an hour, how much will he earn in a ten-hour day?
3. How many fingers and thumbs are there on four dozen pairs of gloves?
4. Multiply each of the following numbers by 10; by 100:
   4, 6, 8, 10, 3, 9, 7, 5, 11, 14, 25, 73, 243, 649.
   How may we multiply a whole number by 10? By 100?
5. If one spool of darning cotton contains 45 yards, how many yards will 30 spools contain?
   30 times 45 yards equals how many times 10 times 45 yards?

$$\begin{array}{r} 45 \text{ yards} \\ \underline{30} \\ 1350 \text{ yards} \end{array}$$

   How may we multiply any number by another number ending in zero?
6. What is the cost of 900 bushels of oats at 36 cents a bushel?
7. Multiply:

84	96	75	68	237	485	379	946
20	30	40	50	60	70	80	90

37	49	54	124	272	234	563	847
200	300	400	500	600	700	800	900

8. What will 40 tons of hay cost at $18 a ton?
9. A bushel of wheat weighs 60 pounds. What is the weight of 231 bushels?
10. If a train goes at the rate of 40 miles an hour, how far will it go in 24 hours?
11. How many times will a clock strike in 30 days if it strikes 156 times each day?
12. How many ounces are there in 17 pounds?
13. How many cubic feet of sand are there in 13 one-horse loads, each containing one cubic yard?

1. A garden is 53 feet long and 24 feet wide. How many square feet does it contain?

Multiplicand 53 square feet,
Multiplier, 24
212
1060
Product, 1272 square feet.

Why do we call the *multiplicand* square feet?
What does the *multiplier* tell?
4 times 53 square feet = ?
20 times 53 square feet = ?
24 times 53 square feet = ?

2. What is the cost of 72 bushels of corn at 47 cents a bushel?
3. A ship can sail 225 miles a day in fair weather, and 160 miles a day in stormy weather. How many miles can it sail in 27 days if 13 of these days are stormy?
4. School is in session 6 hours a day. How many hours is it in session during 26 weeks of 5 days each?
5. There are 38 rows of trees in an orchard, each containing 95 trees. How many trees are there in the orchard?
6. There are 37 kegs of nails, each weighing 137 pounds. Each keg, when empty, weighs 8 pounds. Find the weight of the nails without the kegs.
7. Compare the product of 27 times 54 with that of 54 times 27.

How can you test the correctness of your work in multiplication?

8. Solve:

	(a)	(b)	(c)	(d)	(e)	(f)
Multiplicand,	47	89	68	85	78	92
Multiplier,	14	15	16	17	18	19
Product,						

9. Multiply and test the correctness of each result:

67	35	56	76	145	476	398	714	974
23	32	43	53	37	27	57	83	75

1. A merchant buys 4 dozen pairs of shoes at $2.25 per pair. How much did they cost?
2. A boy reads one book of 316 pages every 2 weeks during the year. How many pages does he read in the year?
3. There are 189 teachers in the schools of a city. Each one has 49 scholars enrolled. How many scholars are there in the city?
4. A lot is 195 feet long and 53 feet wide. How many square feet does it contain?
5. A train runs 37 miles in an hour. How far will it run in two days at the same rate?
6. A man bought 37 horses at $69 each. How much did they cost him?
7. A merchant bought 149 rolls of carpet. Each roll contained 68 yards. How many yards of carpet did he buy?
8. There are 8 cars an hour on a street car line, and each carries 36 persons. How many persons ride on the road from 6 o'clock in the morning until 6 in the evening?
9. A conductor collects 27 5¢ fares, and 6 3¢ fares on each trip for 9 trips. How much money does he collect?
10. A boy gets $3.75 a week and spends 29¢ each week. How much money will he have at the end of 18 weeks at the same rate?
11. A boy sells 29 papers each day 6 days in a week. How many papers does he sell in a year?
12. If there are 17 apples in half a peck, how many apples are there of the same size in 13 bushels?
13. A miller bought 118 bushels of wheat at 78¢ a bushel. How much did it cost him?
14. A boy makes up a club of 17 subscribers for Harper's Young People at $1.65 each. How much money should he collect?

What is the cost of the following articles?

1. 138 pounds of creamery butter at 18¢ a pound?
2. 215 pounds of dairy butter at 17¢ a pound?
3. 348 dozen strictly fresh eggs at $9\frac{1}{2}$¢ a dozen?
4. 48 bushels of new potatoes at 85¢ a bushel?
5. 464 pounds of turkeys at $8\frac{1}{2}$¢ a pound?
6. 378 pounds of chickens at 9¢ a pound?
7. 17 barrels of choice apples at $3.25 a barrel?
8. 29 barrels of common apples at $2.35 a barrel?
9. 67 bunches of bananas at 78¢ a bunch?
10. 29 boxes of lemons at $2.75 a box?
11. 19 boxes of California oranges at $1.95 a box?
12. 13 crates of pineapples at $3.75 a crate?
13. 23 crates of tomatoes at $2.35 a crate?
14. 17 barrels of sweet potatoes at $3.75 a barrel?
15. 378 pounds of white sugar at $4\frac{1}{2}$¢ a pound?
16. 456 pounds of yellow sugar at 4¢ a pound?
17. 17 bags of coffee at $5.83 per bag?
18. 14 tons of timothy hay at $9.50 a ton?
19. 275 bushels of barley at 43¢ a bushel?
20. 58 bushels of No. 1 wheat at $1.05 a bushel?
21. 65 bushels of No. 2 wheat at 98¢ a bushel?
22. 165 bushels of No. 1 corn at 42¢ a bushel?
23. 235 bushels of No. 2 corn at 39¢ a bushel?
24. 256 bushels of white oats at $34\frac{1}{2}$¢ a bushel.
25. 27 bales of cotton at $6.34 a bale?
26. 47 barrels of flour at $6.50 a barrel?
27. 39 bags of bran at $1.35 a bag?
28. 464 pounds of corn meal at $1\frac{1}{4}$¢ a pound?
29. 19 barrels of buckwheat flour at $3.25 a barrel?

NOTE.—These problems may be varied each week, or each month, by taking the market quotations in the newspapers and substituting the prices quoted for those given in the problems.

A LIST OF PRICES IN A CANDY STORE.

	Per lb.	2-lb. Box.	5-lb. Box.
1. Chocolate creams	$ .35	$ .60	$1.55
2. Cream-dipped Brazil nuts	.60	1.15	2.90
3. Caramels	.30	.60	1.50
4. Peppermint pats	.28	.50	1.28
5. Chocolate pats	.32	.60	1.50
6. Maple creams	.40	.80	2.00
7. Fudge	.25	.50	1.25
8. Nut Candy	.30	.60	1.50
9. Paste	.60	1.20	2.80
10. Chocolate-dipped almonds	.50	1.00	2.45
11. Chocolate-dipped pecans	.50	1.00	2.45

1. Which is the cheaper, to buy 2 1-pound boxes of peppermint pats or 1 2-pound box? How much?
2. Which is the cheaper, and how much, to buy 2 1-pound boxes of cream-dipped Brazils, or one 2-pound box?
3. Which is the cheaper, and how much, to buy a 2-pound box of chocolate creams, or 2 1-pound boxes?
4. What is the difference in cost between 5 pounds of chocolate creams, bought at different times, and a 5-pound lot?
5. What is the difference in cost between 5 pounds of cream-dipped Brazils bought at different times and a 5-pound lot?
6. Which costs the more, and how much more, to buy 5 pounds of chocolate pats, or to buy two 2-pound boxes and a separate pound?
7. Which costs the more, and how much more, 3 pounds of fudge or 3 pounds of peppermint pats?
8. How could you buy the following for the least money: 7 pounds of chocolate creams? 4 pounds of paste? 6 pounds of caramels? 7 pounds of cream-dipped Brazils?

Solve orally whenever possible.

1. At 11 cents a pound, what will a 3-pound chicken cost?
2. At 18 cents a dozen, what will 2 dozen eggs cost?
3. At 15 cents a jar, what will 5 jars of Imperial Cheese cost?
4. At 41 cents each, what will 3 woodcocks cost?
5. At 98 cents per bushel, what will 2 bushels of hickory nuts cost?
6. At $1.10 per bushel, what will 5 bushels of onions cost?
7. At $8.00 a box, what will 5 boxes of string beans cost?
8. At $1.75 a bunch, 2 bunches of jumbo bananas cost how much?
9. At 29 cents a pound, what will 3 pounds of dairy butter cost?
10. At 35 cents a pound, what will 3 pounds of creamery butter cost?
11. At $6.50 a barrel, what will 2 barrels of Cape Cod cranberries cost?
12. At $9 a keg, what will 9 kegs of Malaga grapes cost?
13. At $3 per case, what will 15 cases Red Spanish pineapples cost?
14. At 35 cents a dozen, what will 3 dozen lemons cost?
15. At 25 cents a jar, what will 9 jars of preserved ginger cost?
16. At a Saturday market sale a lady bought the following:
    2 roast chickens at $1.00 each.
    4 half-pint glasses of cooked cranberries at 5 cents a glass.
    2 dozen tea-biscuit at 10 cents per doz.
    2 pounds of macaroons at 40 cents per pound.
    What was her bill?
17. Traveling 78 miles a day, how long will it take a man to make a trip of 25,350 miles? How many weeks, and how many days over, will that be?

1. A boy who had 370 pennies in his bank, exchanged them for dimes. How many dimes did he receive?

   10c)370c
   ?

   How many tens are there in the dividend? In the divisor? What is the quotient?

2. How many weeks will it take a man to earn $860 at $20 a week?

   $20)$860
   ?

   How many tens are there in the dividend? How many tens are there in the divisor? What is the quotient?

3. If a grain merchant sells 300 bu. of grain a day, how long will it take him to sell 74700 bu.?

   300)74700
   ?

   The *number* of hundreds of bu. in the dividend divided by the *number* of hundreds of bu. in the divisor equals what?

4. Divide 20, 30, 40, 60, 90, 70, 80, each by 10. What is a short way to divide by 10 when the dividend ends in zero?

   Divide 250, 520, 750, 640, 980, 370, each by 10.

5. Divide 400, 900, 800, 500, 300, each by 100. In such cases what is a short way to divide by 100?

   Divide 7500, 8900, 2400, 6400, 3700, each by 100.

6. Divide 7000, 9000, 2000, 8000, each by 1000. In such cases what is a short way to divide by 1000?

   Divide 75000, 26000, 367000, 845000, each by 1000.

7. Solve:

480 ÷ 30	3600 ÷ 1200	16000 ÷ 2000
720 ÷ 40	2700 ÷ 900	21000 ÷ 7000
540 ÷ 60	6300 ÷ 700	60000 ÷ 12900
270 ÷ 90	13200 ÷ 1100	25000 ÷ 5000
650 ÷ 50	8400 ÷ 400	24000 ÷ 3000
490 ÷ 70	5000 ÷ 1000	54000 ÷ 9000

1. Review pages 43 and 44.

2. If a steamboat goes at the rate of 21 miles an hour, how long will it take it to go 252 miles?

$$\begin{array}{r} 12 \\ 21\overline{)252} \\ 210 = 21 \times 10 \\ \hline 42 \\ 42 = 21 \times 2 \\ \hline \end{array}$$

How many times is 21 contained in 25 tens?

If 21 tens is subtracted from 252, how many times will 21 be contained in the remainder?

$252 \div 21 = 12$ Prove it by multiplying 21 by 12.

3. Solve: $21\overline{)462}$ $21\overline{)672}$ $21\overline{)294}$ $22\overline{)264}$ $22\overline{)484}$

4. An orchard contains 768 trees. If there are 32 rows of trees, how many trees are there in each row?

$$\begin{array}{r} 24 \\ 32\overline{)768} \\ 64 \\ \hline 128 \\ 128 \\ \hline \end{array}$$

How many times is 32 contained in 76 tens?

If 32 times 2 tens is subtracted from 768, how many times will 32 be contained in the remainder?

$768 \div 32 = 24$ Prove it.

5. Solve and prove:

$21\overline{)420}$ $32\overline{)960}$ $43\overline{)8600}$ $53\overline{)10600}$ $64\overline{)1280}$

$82\overline{)1640}$ $63\overline{)1890}$ $72\overline{)2160}$ $91\overline{)18200}$ $83\overline{)2490}$

$83\overline{)1743}$ $42\overline{)4620}$ $71\overline{)4260}$ $91\overline{)4732}$

6. Solve and prove:

$756 \div 42 =$	$1118 \div 43 =$	$1368 \div 72 =$	$1606 \div 73 =$
$992 \div 62 =$	$1196 \div 92 =$	$1951 \div 93 =$	$1909 \div 83 =$
$884 \div 52 =$	$1512 \div 63 =$	$1325 \div 53 =$	$1148 \div 82 =$
$768 \div 24 =$	$4884 \div 44 =$	$2954 \div 14 =$	$1360 \div 34 =$

1. 1955 pounds of coal were put into 23 bags holding equal weights. How many pounds were in each bag?

LONG DIVISION.

85 *quotient.*
Divisor. 23)1955 *dividend.*
184
115
115
0 *remainder.*

Answer, 85 pounds.

First find how many times 23 goes in 195 thus: 2 in 19, 9 times. But $9 \times 23 = 207$. 207 is larger than 195. We now decide 23 goes only 8 times in 195.

Subtract 8×23 (=184) from 195, getting 11. Annex the next figure (5) of the dividend. Then 2 in 11, 5 times. $5 \times 23 = 115$. Subtracting, find the remainder 0. This means 23 goes exactly 85 times in 1955.

2. The area of Maryland is nearly 12216 square miles. About how large would one of its 24 counties be, if all were of the same size?

3. If each box holds 29 pencils, how many boxes are needed to hold 1218 pencils?

42
29)1218
116 $= 29 \times ?$
58
58 $= 29 \times ?$

29 being nearly 30, use 30 as a *trial divisor.*

4. Divide:

24)912	27)1161	34)1564	38)1824	46)1702
38)1634	48)1728	59)1534	49)1715	67)2278
53)1378	57)1881	59)2714	62)1736	66)3168
68)3672	74)4144	79)4819	83)5312	87)4872

5. There are 1248 pupils in a certain school and there are 48 pupils in each recitation room. How many recitation rooms are there in the school?

1. A boy sells 98 penny papers a day that cost one-half cent apiece. How many days will it take him to clear $12.74?
2. A ton of coal occupies a space of 35 cu. ft. How many tons will a car hold whose capacity is 840 cu. ft.?
3. The cost of a cement sidewalk, 7 ft. wide and 50 ft. long, was $49. How much did it cost per sq. ft.?
4. A pane of glass 19 in. wide contains 665 sq. in. How long is it?
5. It cost $31.20 to lay an oak floor at 16 cents a sq. ft. How many sq. ft. did the floor contain?
6. A vineyard contained 306 grapevines, planted in rows. Each row contained 18 vines. How many rows were there?
7. A farmer sold a number of cattle at an average of $59 a head, receiving $4248. How many head of cattle did he sell?
8. How many spaces of 330 ft. are there in a mile?
9. At 75 cents per 1000 cu. ft. of gas, how many thousand cu. ft. must a man have burned whose gas bill was $35.25?
10. A man received $26.22 for a load of corn at $.46 a bu. How many bu. did the load contain?
11. 2808 pencils were distributed equally among 9 schools. Each school distributed its share equally among 13 of its rooms. How many pencils did each room receive? Solve in two ways.
12. Write problems based on the following facts:

	Dividend.	Divisor.	Quotient.
(*a*)	1843 men.	97 men.	?
(*b*)	3717 sq. in.	?	63 inches.
(*c*)	?	$34	160 men.
(*d*)	2376 books.	88 books.	?

1. To send a money order of $60 costs 20 cents. How many such orders could be sent for $4.00 or 400 cents?
2. 40 rods = 1 furlong. How many furlongs in 9240 rods?
3. A Mark (German money) equals about 24 cents in United States money. How many marks in $5.52? In $6.96? In $11.38?
4. It costs $23 to make a trip from New York to Chicago. At that rate, how many persons could go from New York to Chicago for $575?
5. A man spent $900 in buying equal amounts of coal for 45 families. How many dollars were spent for each family?
6. 1536 acres of land were divided equally among 32 farmers. How many acres were given to each?
7. 2400 selected apples were packed in 32 baskets. How many apples were packed in each basket?
8. A library of 1092 volumes was arranged on 42 shelves. How many volumes were on each shelf?
9. At 60 cents each, how many footballs will $7.20 buy?
10. In a block containing 21 houses, a girl counted 315 windows. How many windows was that to each house?
11. A hall containing 768 square feet was 24 feet wide. How long was it?
12. At 15 cents each, how many shirt waists can be laundered for $3.00?
13. At 22 cents an hour, in how many hours will a man earn $5.28?
14. A granite block containing 60 cubic feet is 4 feet long and 3 feet wide. How high is it?
15. How many dozen pineapples, at 84 cents a dozen, can be bought for $12.60?
16. How many dozen eggs, at 23 cents a dozen, can be bought for $5.98?

1. At 80¢ a gallon, what is the value of one quart?
2. How many years do 1728 months equal?
3. If 8 gallons of syrup cost $12.80, what does 1 gallon cost? One pint?
4. A boy in school for 7 years and 4 months studies history during one-eighth of the time. How many months does he study history?
5. A man pays $50 a month for rent, and $\frac{1}{5}$ as much for gas. How much does he pay for both?
6. A grocer sold 6 pounds of tea for $4.80. How much did he get a pound for it? How much an ounce?
7. A person bought land for $4572, he sold it for $\frac{1}{11}$ more than it cost; for how much did he sell it?
8. How many cans holding 5 pounds each can be filled from 2 hundredweights of coffee?
9. A girl divided one-third of 195 nuts equally among 5 friends. How many did each receive?
10. How many feet long is a platform 720 inches long?
11. In a fire a man lost one-twelfth of his goods, all of which were valued at $9,876. How many dollars worth of goods did he lose?
12. A farmer owning 1,272 acres of land divided it into 2 equal parts; one of these parts he again divided into 3 equal parts, giving one of these parts to each of his 3 sons, and keeping the rest himself. How many acres had he left? How many acres had each son?
13. A book case contained 203 books, each of the 7 shelves containing the same number of books. How many books were there on a shelf?
14. A man sold 11 bicycles for $495. They were all sold for the same price. For how much did he sell each one?
15. A man sold 9 horses for $783, receiving the same price for each one. For how much did he sell each horse?

PERSONAL ACCOUNTS OF TWO BOYS.

Weekly Account

March

3	Salary		7.00
	St. Car	10	
	Lunch	15	
4	Necktie	25	
	St. Car	10	
	Lunch	10	
5	St. Car	10	
	Lunch	20	
	Pencil	05	
6	St. Car	10	
	Lunch	15	
	Collars	12	
7	St. Car	10	
	Lunch	10	
8	St. Car	10	
	News paper	06	
	Laundry	15	
	Board	2.75	
	Savings bank	50	

Yearly Expense

Vacation	10.00
Books etc	5.00
Clothing etc	35.00

Monthly Account

Salary		40.00
R. R. Ticket	2.25	
Board & Room	18.00	
Lunches	3.75	
Laundry	70	
Savings bank	3.50	
Collars & ties	50	
News paper	30	

Yearly Expense

Vacation	10.00
Books etc	9.00
Clothing	40.00

1. Find the daily expense for each day in the weekly account. In a year, how much was spent for car fare? Lunches?
2. At the salary given in the monthly account (the yearly expenses as given), how much would be saved in a year? In 5 years?
3. At the salary given in the weekly account, how much would a boy earn in a year? How much would he save, counting the yearly expenses as given?
4. Make and solve other problems from these accounts.

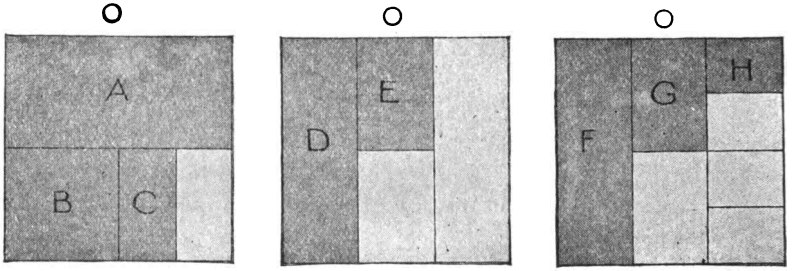
A merchant offered the following lots of goods for sale:

2 suits boys' clothes	$ 8.50
15 dozen handkerchiefs	27.00
12 dozen pairs suspenders	36.00
50 boxes (each containing ½ dozen pairs) of stockings	60.00
3 dozen shirt waists	16.20
1 dozen pairs trousers	15.00
½ dozen waistcoats	3.00
3 dozen caps	5.40
4 dozen hats	12.00
10 boxes of collars, each holding ½ dozen	6.00

1. As sold in this way, what was the cost of:
   Each suit?
   Each dozen handkerchiefs?
   Each handkerchief?
   Each dozen pair of suspenders?
   Each pair of suspenders?
   Each box of stockings?
   Each half-dozen pairs of stockings?
   Each pair of stockings?
   Each dozen shirt waists?
   Each shirt waist?
   Each pair trousers?
   Each dozen caps?
   Each dozen hats?
   Each box of collars?
   Each half-dozen collars?
   Each collar?
2. A second merchant bought the whole lot of goods at $187. Did the first merchant sell for more or less than the price offered? How much difference between the two prices?

1. An acre of tobacco is valued at about \$52, an acre of sweet potatoes at \$37, an acre of sugar beets at \$30, and an acre of peanuts at \$14. At this rate, what is the entire value of 2 acres of each?
2. To send a telegram from Chicago to San Francisco costs \$.75 for the first 10 words, and 5 cents for each added word. What would a message of 19 words cost?
3. At 40 cents for the first 10 words, and 3 cents for each added word, what will it cost to send the following telegram from Chicago to New York City: "Express two hundred Mother Goose, fifty Jo's Boys, one hundred twenty Little Women"?
4. Mrs. Brown had 3 sons. John earned \$5 a week, Harry earned \$7, and William as much as the other two together. How much did William earn? How much did they all earn?
5. John saved $\frac{1}{5}$ of his money each week. How many dollars did he save? How many did he spend?
6. Harry saved $\frac{1}{2}$ of his money. How many dollars did he save? How many did he spend?
7. William saved $\frac{1}{4}$ of his money. How many dollars did he save? How many did he spend?
8. How much did the 3 boys together save in a week? How much did they spend in a week? In a month?
9. A room is 12 x 15 feet. How many strips of carpet a yard wide will be needed to carpet it? How long must each strip be? How many yards will it take for the whole room? What will it cost at 40 cents a yard?
10. A mounting block of granite contained 24 cubic feet and was 2 feet high and 3 feet wide. How long was it?
11. A lamp post 12 feet high was 2 feet in the ground. What part of it was in the ground? What part was in the air? How many feet were in the air?

1. An Angora kitten was bought for \$6 and sold for $\frac{1}{3}$ more than that price. What was the selling price?
2. If peanuts are bought at \$5 a bushel and sold at 5 cents a half-pint glass, what is the gain on a bushel?
3. The railroad fare from Chicago to Madison, Wis., is \$3.92. What will it cost for 5 persons to make the trip and return?
4. What is the difference between the buying price and the selling price of a bicycle that was bought for \$35 and sold for $\frac{1}{4}$ more than it cost?
5. A boy bought 3 oranges for 10 cents, and traded them for 5 apples. What were the apples worth apiece in money?
6. A boy bought a pony for \$35. He had it shod for \$2, and kept it a month at an expense of \$4. He then sold it for \$40. Did he gain or lose, and how much?
7. One spring the robins arrived in the country bordering the southern part of the Great Lakes March 2. The bluebirds came 25 days later. On what date did the bluebirds arrive?
8. In 1900 the government gave \$25,000 to the reindeer stations in Alaska. Only \$19,330 was used. How much was left?
9. During the week ending March 4, 1905, there were received in the stockyards, Omaha, 69,296 cattle, 6,124 calves, 178,077 hogs, and 73,400 sheep. The shipments for the same week were 32,191 cattle, 327 calves, 62,953 hogs, and 19,896 sheep. How many cattle, calves, hogs, and sheep were received during that week?
10. How many cattle were not shipped? How many calves? How many hogs? How many sheep?
11. How many animals remained?
12. At 18 cents a pound, how many pounds of sirloin steak can be bought for 90 cents?



1. What part of the square, O, = A?
2. What part of A = B? What part of B = C?
3. B = what part of O?
4. C = what part of O?
5. How many A's = O? How many B's? C's?
6. In 1 how many $\frac{1}{2}$'s? $\frac{1}{4}$'s? $\frac{1}{8}$'s?
7. What part of $\frac{1}{2} = \frac{1}{4}$?
8. What part of $\frac{1}{4} = \frac{1}{8}$?
9. What part of $\frac{1}{2} = \frac{1}{8}$?
10. $\frac{1}{2}$ = how many $\frac{1}{4}$'s? How many $\frac{1}{8}$'s?
11. What is the sum of $\frac{1}{2}$ and $\frac{1}{2}$?
12. What is the sum of $\frac{1}{4}$ and $\frac{1}{4}$?
13. $\frac{1}{8} + \frac{1}{8} = ?$
14. $\frac{1}{2} + \frac{1}{4} = ?$
15. $\frac{1}{4} + \frac{1}{8} = ?$
16. One half a dollar and $\frac{1}{4}$ of a dollar are equal to what part of a dollar?
17. One-fourth of a pie and $\frac{1}{8}$ of a pie are what part of a pie?
18. Marie cut a pie into 8 pieces and gave each one in the family one piece. There were 4 in the family. What part of the pie was used?
19. Harry bought a piece of wire. He divided half of it into fourths, and half into eighths. How many of each did he have? He used $\frac{3}{4}$ of the wire. How many eighths did he use?

1. On page 158, E is what part of the square, O? How many E's = O? How many E's = D?
2. How many F's in O? How many G's in F? How many G's in O? G = what part of F? What part of O?
3. How many H's in G? In F? In D?
4. How many $\frac{1}{3}$'s in O? In 1?
5. How many $\frac{1}{6}$'s in 1? How many $\frac{1}{12}$'s in 1?
6. How many $\frac{1}{6}$'s = $\frac{1}{3}$?
7. How many $\frac{1}{6}$'s = $\frac{2}{3}$?
8. How many $\frac{1}{12}$'s = $\frac{1}{6}$? $\frac{3}{6}$? $\frac{5}{6}$? $\frac{1}{3}$? $\frac{2}{3}$?
9. What is the sum of $\frac{1}{2}$ and $\frac{1}{6}$?
10. What is the sum of $\frac{1}{2}$ and $\frac{2}{6}$? $\frac{1}{2}$ and $\frac{1}{3}$?
11. What is the sum of $\frac{1}{2}$ and $\frac{1}{12}$? $\frac{1}{2}$ and $\frac{5}{12}$?
12. What is $\frac{1}{2}$ of $\frac{1}{6}$?
13. What is $\frac{1}{2}$ of $\frac{6}{12}$? Of $\frac{2}{3}$? Of $\frac{8}{12}$? Of $\frac{10}{12}$?

14.

$\frac{1}{2} + \frac{1}{2} = ?$	$\frac{1}{3} + \frac{1}{3} = ?$	$\frac{1}{4} + \frac{3}{4} = ?$
$\frac{1}{2} + \frac{1}{3} = ?$	$\frac{1}{3} + \frac{1}{4} = ?$	$\frac{1}{4} + \frac{1}{6} = ?$
$\frac{1}{2} + \frac{1}{4} = ?$	$\frac{2}{3} + \frac{1}{12} = ?$	$\frac{1}{4} + \frac{1}{8} = ?$
$\frac{1}{2} + \frac{1}{8} = ?$	$\frac{1}{3} + \frac{1}{6} = ?$	$\frac{1}{4} + \frac{1}{12} = ?$
$\frac{1}{2} + \frac{1}{6} = ?$	$\frac{1}{3} + \frac{1}{12} = ?$	$\frac{1}{4} + \frac{2}{4} = ?$
$\frac{2}{3} + \frac{1}{4} = ?$	$\frac{3}{4} + \frac{1}{2} = ?$	$\frac{2}{3} + \frac{3}{4} = ?$
$\frac{2}{3} + \frac{1}{2} = ?$	$\frac{3}{4} + \frac{1}{6} = ?$	$\frac{3}{4} + \frac{5}{8} = ?$
$\frac{2}{3} + \frac{1}{6} = ?$	$\frac{3}{4} + \frac{1}{8} = ?$	$\frac{5}{6} + \frac{1}{12} = ?$
$\frac{2}{3} + \frac{1}{3} = ?$	$\frac{3}{4} + \frac{1}{12} = ?$	$\frac{3}{8} + \frac{1}{2} = ?$

15. Amanda cut a cake into 12 pieces. She put $\frac{1}{2}$ the cake into a box, $\frac{1}{4}$ on a plate, and the rest on a paper. How many pieces were in the box? On the plate? On the paper?
16. Willard bought a round chocolate loaf. He divided half of it into sixths and the rest into twelfths. He gave away 4 of the sixths and 3 of the twelfths. What part of the cake did he give away?

1. Draw a square and show the answers to these problems:

2. $\frac{3}{4} - \frac{2}{4} = ?$ $\frac{7}{8} - \frac{1}{8} = ?$ $\frac{1}{2} - \frac{1}{3} = ?$ $1\frac{7}{12} - \frac{1}{2} = ?$
$\frac{1}{2} - \frac{1}{4} = ?$ $\frac{3}{4} - \frac{1}{2} = ?$ $\frac{1}{3} - \frac{1}{6} = ?$ $1\frac{9}{12} - \frac{1}{4} = ?$
$\frac{1}{2} - \frac{1}{8} = ?$ $\frac{5}{8} - \frac{1}{2} = ?$ $\frac{2}{3} - \frac{1}{6} = ?$ $\frac{7}{8} - \frac{1}{2} = ?$

3. What is $\frac{1}{2}$ of $\frac{1}{4}$? What is $\frac{1}{3}$ of $\frac{1}{2}$? What is $\frac{1}{4}$ of $\frac{1}{2}$?
What is $\frac{1}{2}$ of $\frac{1}{3}$? What is $\frac{1}{3}$ of $\frac{1}{3}$? What is $\frac{1}{4}$ of $\frac{1}{3}$?
What is $\frac{1}{2}$ of $\frac{1}{6}$? What is $\frac{1}{3}$ of $\frac{1}{8}$? What is $\frac{1}{4}$ of $\frac{2}{3}$?

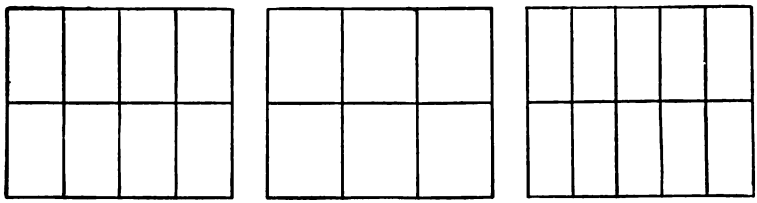
4. What is $\frac{1}{2}$ of 6? What is $\frac{1}{2}$ of 12? What is $\frac{1}{4}$ of 4?
What is $\frac{1}{3}$ of 6? What is $\frac{2}{3}$ of 6? What is $\frac{1}{4}$ of 12?
What is $\frac{1}{3}$ of 9? What is $\frac{2}{3}$ of 9? What is $\frac{1}{3}$ of 12?
What is $\frac{1}{4}$ of 8? What is $\frac{3}{4}$ of 8? What is $\frac{1}{3}$ of 18?

5. 2 times $\frac{1}{2} = ?$ 3 times $\frac{2}{3} = ?$ 4 times $\frac{1}{2} = ?$
2 times $\frac{1}{3} = ?$ 3 times $\frac{3}{4} = ?$ 4 times $\frac{1}{3} = ?$
2 times $\frac{2}{3} = ?$ 3 times $\frac{3}{8} = ?$ 4 times $\frac{1}{4} = ?$
3 times $\frac{1}{3} = ?$ 3 times $\frac{5}{8} = ?$ 4 times $\frac{2}{3} = ?$
3 times $\frac{3}{3} = ?$ 3 times $\frac{7}{8} = ?$ 4 times $\frac{3}{4} = ?$

6. 2 times
$\frac{1}{2}$ of 6 = ? $\frac{3}{4}$ of 8 = ? $\frac{1}{3}$ of 9 = ?
$\frac{1}{3}$ of 6 = ? $\frac{1}{2}$ of 10 = ? $\frac{2}{3}$ of 9 = ?
$\frac{1}{2}$ of 8 = ? $\frac{1}{3}$ of 12 = ? $\frac{1}{2}$ of 16 = ?
$\frac{1}{4}$ of 8 = ? $\frac{3}{4}$ of 12 = ? $\frac{1}{3}$ of 18 = ?

7. 3 times
$\frac{1}{2}$ of 6 = ? $\frac{3}{4}$ of 8 = ? $\frac{1}{2}$ of 12 = ?
$\frac{1}{3}$ of 6 = ? $\frac{1}{5}$ of 10 = ? $\frac{1}{3}$ of 12 = ?
$\frac{2}{3}$ of 6 = ? $\frac{2}{5}$ of 10 = ? $\frac{2}{3}$ of 12 = ?
$\frac{1}{4}$ of 8 = ? $\frac{3}{5}$ of 10 = ? $\frac{1}{3}$ of 9 = ?
$\frac{1}{4}$ of 12 = ? $\frac{3}{4}$ of 12 = ? $\frac{2}{3}$ of 9 = ?

8. 4 times
$\frac{1}{2}$ of 6 = ? $\frac{1}{2}$ of 16 = ? $\frac{1}{5}$ of 20 = ?
$\frac{1}{3}$ of 6 = ? $\frac{1}{3}$ of 15 = ? $\frac{1}{4}$ of 20 = ?
$\frac{1}{2}$ of 8 = ? $\frac{1}{4}$ of 16 = ? $\frac{3}{4}$ of 20 = ?
$\frac{1}{4}$ of 8 = ? $\frac{1}{5}$ of 25 = ? $\frac{1}{3}$ of 18 = ?
$\frac{1}{4}$ of 12 = ? $\frac{1}{5}$ of 15 = ? $\frac{2}{3}$ of 18 = ?
$\frac{3}{4}$ of 8 = ?



A B C

1. Into how many parts is A divided?
2. Find $\frac{1}{2}$ of A. How many 4ths of A in $\frac{1}{2}$ of A?
3. How many 8ths in $\frac{1}{2}$ of A?
4. Find $\frac{1}{4}$ of A. How many 8ths of A in $\frac{1}{4}$ of A?
5. Into how many parts is B divided?
6. Find $\frac{1}{2}$ of B. How many 6ths in $\frac{1}{2}$ of B?
7. How many 6ths in $\frac{1}{3}$ of B?
8. Into how many parts is C divided?
9. Find $\frac{1}{2}$ of C. How many 10ths in $\frac{1}{2}$ of C?
10. How many 10ths in $\frac{1}{5}$ of C?
11. How many $\frac{1}{2}$'s in $1\frac{1}{2}$ A? In $1\frac{1}{2}$? In $2\frac{1}{2}$?
12. How many $\frac{1}{4}$'s in $1\frac{1}{4}$ A? In $1\frac{1}{4}$? In $1\frac{3}{4}$? In $2\frac{3}{4}$?
13. How many $\frac{1}{8}$'s in $1\frac{1}{8}$ A? In $1\frac{1}{8}$? In $3\frac{2}{8}$? In $5\frac{7}{8}$?
14. How many $\frac{1}{3}$'s in $1\frac{1}{3}$ B? $1\frac{1}{3}$? $1\frac{2}{3}$? $2\frac{2}{3}$?
15. How many $\frac{1}{6}$'s in $1\frac{1}{6}$ B? $1\frac{1}{6}$? $1\frac{5}{6}$? $\frac{1}{3}$ B? $1\frac{1}{3}$? $1\frac{2}{3}$?
16. How many $\frac{1}{5}$'s in $1\frac{1}{5}$ C? $1\frac{1}{5}$? $1\frac{2}{5}$? $2\frac{3}{5}$?
17. How many $\frac{1}{10}$'s in $1\frac{1}{10}$ C? In $1\frac{1}{10}$? $1\frac{8}{10}$? $1\frac{3}{10}$? $2\frac{5}{10}$? $2\frac{9}{10}$? $3\frac{1}{5}$? $3\frac{2}{5}$?
18. $1\frac{1}{2} + 2\frac{1}{2} = ?$ $1\frac{1}{2} + 1\frac{1}{4} = ?$ $1\frac{1}{2} + 2\frac{1}{3} = ?$ $2\frac{1}{2} + 1\frac{2}{3} = ?$ $2\frac{1}{3} + 1\frac{2}{4} = ?$ $1\frac{1}{2} - \frac{1}{2} = ?$ $1\frac{1}{2} - \frac{1}{4} = ?$
19. $1\frac{1}{2} + 2\frac{3}{4} = ?$ $1\frac{1}{2} + 1\frac{1}{8} = ?$ $2\frac{1}{2} + 5\frac{3}{8} = ?$ $1\frac{3}{8} + 1\frac{1}{2} = ?$ $1\frac{7}{8} + 1\frac{1}{4} = ?$ $2\frac{1}{2} - 1\frac{1}{2} = ?$ $2\frac{1}{2} - 1\frac{1}{4} = ?$
20. $1\frac{1}{5} + 2\frac{4}{5} = ?$ $3\frac{2}{5} + 1\frac{1}{5} = ?$ $1\frac{1}{5} + 1\frac{1}{10} = ?$ $1\frac{4}{5} + 1\frac{1}{10} = ?$ $1\frac{4}{5} + 1\frac{3}{10} = ?$ $3\frac{7}{8} - 1\frac{5}{8} = ?$ $2\frac{9}{10} - 1\frac{1}{5} = ?$

1. What is the weight of 4 packages together, the first weighing $\frac{1}{8}$ of a pound; the second, $\frac{1}{4}$ of a pound; the third, $\frac{3}{8}$ of a pound; and the fourth, $1\frac{1}{4}$ pounds?
2. A tailor uses $4\frac{1}{3}$ yards of cloth for a coat; $1\frac{1}{6}$ yards for a vest; and $3\frac{5}{12}$ yards for a pair of trousers. How many yards does he use for the suit?
3. A man sold $3\frac{1}{4}$ pounds of butter to one customer, $2\frac{1}{2}$ pounds to another, and $4\frac{3}{8}$ to a third. How many pounds did he sell to all three?
4. A lady spends $\frac{1}{2}$ of the year in the city, $\frac{1}{4}$ of the year at the seashore, and the rest of the year in traveling? What part of the year does she spend in traveling?
5. From a piece of cloth 15 yards long, $8\frac{1}{3}$ yards were sold at one time and $2\frac{1}{6}$ yards at another time. How many yards were sold in all? How many yards were left?
6. A baker having 5 dozen biscuits, sold $1\frac{1}{2}$ dozen to one man, and $3\frac{1}{2}$ dozen to another. How many dozen did he sell in all? How many had he left?
7. $\frac{1}{2}$ of John's kite string is whip-cord, the rest is cotton string in 2 pieces, the first piece is $\frac{1}{3}$ as long as the whip-cord. What part of the entire string is the first piece of cotton string? The second piece?
8. A grocer having $\frac{2}{3}$ of a dozen of pineapples, sold $\frac{1}{2}$ of them. What part of a dozen did he sell?
9. One boy stays in the country $\frac{1}{3}$ of each year, a second boy stays $\frac{1}{3}$ as long as the first boy? What part of the year does the second boy stay?
10. How many boxes holding $\frac{1}{4}$ of a pound of candy each, can be filled from $\frac{1}{2}$ a pound? From $\frac{3}{4}$ of a pound? From $1\frac{1}{4}$ pounds?
11. A man bought $1\frac{1}{4}$ pounds of nuts and divided them equally among his 5 children. What part of a pound did each receive?

1. A boy bought at the grocery 1 pound of sugar, $1\frac{1}{2}$ pounds of butter and $\frac{1}{4}$ pound of tea. How many ounces did the three weigh together?
2. A man bought $3\frac{1}{2}$ pounds of sugar and returned 12 ounces of it. How many ounces did he keep?
3. A grocer put 5 pounds of sugar into 2 equal packages. How many ounces in each package?
4. A woman bought at the grocery $1\frac{1}{2}$ pounds of butter at 24¢ a pound; a quarter of a pound of tea at 60¢ a pound and 4 pounds of sugar at $5\frac{1}{2}$¢ a pound. How much was her bill?
5. A clerk sold one customer 7 yards of cloth at 80¢ a yard; 9 yards of ribbon at 16¢ a yard and $\frac{1}{2}$ a yard of velvet at $1.50 a yard. What was the amount of his sale?
6. A man bought a hatchet for 75¢, a saw for $1.25, $6\frac{1}{2}$ pounds of nails at 4¢ a pound, and 2 dozen screws at 9¢ a dozen. What was his bill?
7. A grocer bought 3 barrels of sugar containing 198 pounds each, at 4¢ a pound; a box of tea containing 23 pounds at 45¢ a pound, and 2 sacks of coffee containing 75 pounds each at 20¢ a pound. What was his bill?
8. A merchant bought 3 dozen pairs of shoes at $2.25 per pair, one dozen at $2.50 a pair, and one-half dozen at $2.75 a pair. How much was his bill?
9. A bookseller bought 50 books at 36¢ each, 2 dozen boxes of paper at 13¢ each, 9 dozen pencils at 11¢ a dozen. What was his bill?
10. Railroad fare is 3¢ per mile. From Chicago to Aurora it is 37 miles; from Aurora to Galesburg, 126 miles; from Galesburg to Burlington, 43 miles. What is the fare from Chicago to Aurora? From Aurora to Galesburg? From Galesburg to Burlington? What is the fare from Chicago to Burlington?

1. A man owns a lot on which he builds 2 houses. The first is $24\frac{1}{2}$ feet wide and 63 feet long; the second is 25 feet wide and $62\frac{1}{2}$ feet long. What is the area of the ground covered by the two houses?
2. The lot is 125 feet long and 60 feet wide. What is the area of the ground not covered by the houses?
3. On each side of 360 feet of the length of a street which is 60 feet wide, there is a sidewalk 7 feet wide. What is the area of the remainder of the street?
4. A railroad runs a train of 3 cars every 30 minutes from 6 o'clock in the morning until 6 in the evening. How many cars run over the track in the 12 hours?
5. A man mails 40 letters requiring 2¢ postage each, 375 circulars requiring 1¢ postage each, and 36 packages which require 4¢ each. What is the cost of the postage on the whole?
6. A man subscribed for the Youth's Companion for one year at $1.75, for St. Nicholas for 6 months at $2.50 a year, for the Century for 3 months at $4 a year and for McClure's for 18 months at $1 a year. How much must he pay for all the subscriptions?
7. A boy bought 24 1-cent papers at $\frac{3}{4}$¢ each, 16 2-cent papers at $1\frac{1}{4}$¢ each and 5 10-cent magazines at 7¢ each. He sold his entire stock at regular prices. How much money did he make?
8. A boy gets $3.75 for a week's work; he pays 10¢ each day for lunches, buys a ball for 15¢ and a stamp album for 75¢. How much money does he have left at the end of the week?
9. A man gets $17.50 a week for four weeks. In that time he pays $11 for rent, buys half a ton of coal at $7.50 a ton, pays $12.75 for groceries and $6.93 for dry goods. How much money has he left from his salary?

1. 48 men dig a cellar in 18 days. In how many days could 12 men dig it?
2. How many $\frac{1}{2}$-pound packages can be made from 18 chests of tea, each containing 60 pounds?
3. How many pounds of sugar at 6¢ a pound will equal in value 258 gallons of syrup at 40¢ a gallon?
4. A merchant exchanged 70 barrels of sugar at $22.50 per barrel for flour at $5 per barrel. How many barrels of flour did he receive?
5. If 250 desks which cost $9 each are sold for $12 each, what will be the gain?
6. What will 144 quarts of strawberries cost at 50¢ a peck?
7. What is the difference between 829 tons and $\frac{1}{12}$ of 9648 tons?
8. Mr. Monroe spends $139.65 in January, $15.25 more in February than in January, and $15.25 more in March than in February. How much does he spend in all?
9. A gentleman paid for a purchase with a $5 bill, and received back in change one half-dollar, 3 quarters, 2 dimes and 2 nickels. What was the amount of his change? What was the amount of his purchase?
10. Find the distance in inches around a room that is 18 feet long and $14\frac{1}{2}$ feet wide.
11. A woman received $10,000 for a farm. She gave $1000 to a church, $500 to a school, and $2980 to a hospital. How much of the money had she left?
12. A carpenter bought 464 feet of lumber at one time and $\frac{1}{8}$ as much at another time. How many feet did he buy in all?
13. There are 387 squares of marble in the floor of the dining-room and seven-ninths as many in the parlor floor. How many squares in the parlor floor? How many in both floors?

1. A man paid \$24 for a suit of clothes, $\frac{1}{6}$ as much for a pair of shoes, $\frac{1}{8}$ as much for a hat. What was the cost of the entire outfit?
2. A man paid for his house \$4860; the lot cost him $\frac{1}{3}$ as much as the house; the grading, fencing and street cost $\frac{1}{4}$ as much as the lot. What did the three cost him?
3. A bookseller sold \$128 worth of books in one day. They cost him $\frac{1}{8}$ less than he sold them for. How much was his profit and what did the books cost him?
4. A bookseller sold 64 books at $12\frac{1}{2}¢$ each, 48 books at $15¢$ each, and 60 books at $25¢$ each. How much money did he receive?
5. There are 60 pupils in the school room. 24 of them have 4 books each, 26 of them have 3 books each, and the remainder have 5 books to each group of 2 pupils. How many books are there in the room?
6. A man is 48 years old; his wife is 44; the oldest son is $\frac{1}{4}$ as old as the father and mother together; the second son is $\frac{1}{3}$ as old as the father. What is the sum of the ages of the father, mother and two boys?
7. A boy left home for college on the morning of September 5th. He returned home on the morning of December 23rd. How many days was he away from home?
8. A family bought 1 quart of milk every day in January, February and March of a Leap Year. How many gallons did they buy in the 3 months?
9. For \$20 in gold a man received a five-dollar bill, 7 silver dollars, and the rest equally in half dollars and quarters. How many half dollars did he get? How many quarters?
10. How many yards of wire are needed to build a fence six wires high around a garden 48 feet wide and 72 feet long?

A SCHOOL PROGRAM.

Time.	Recitation.	Study Period.
9:00 to 9:10	Morning Exercises.	
9:10 to 9:25	Language, A.	Written Work, B.
9:25 to 9:40	Language, B.	Written Work, A.
9:40 to 10:10	Arithmetic, A.	Study Reading, B.
10:10 to 10:30	Reading, B.	Study Arithmetic, A.
10:30 to 10:45	Recess.	
10:45 to 11:10	Arithmetic, B.	Study Reading, A.
11:10 to 11:30	Reading, A.	Study Arithmetic, B.
11:30 to 11:35	Calisthenics,	A and B.
11:35 to 11:45	Written Spelling,	A and B.
11:45 to 12:00	Writing,	A and B.
1:30 to 1:45	Music,	A and B.
1:45 to 2:10	Geography, A.	Study Geography, B.
2:10 to 2:35	Geography, B.	Study Geography, A.
2:35 to 2:50	Recess.	
2:50 to 3:10	Oral Spelling, A and B.	
3:10 to 3:15	Calisthenics,	A and B.
3:15 to 3:50	Drawing,	A and B.

1. Find the time given to each recitation.
2. Find the time given to morning exercises; to morning recess; to music; to afternoon recess; to calisthenics in the morning; to drawing.
3. How much time does the A class spend in reciting and studying arithmetic? Reading? Geography?
4. Answer the same questions for the B class.
5. How much time, during one whole day, is given to calisthenics and recesses? To writing, music and drawing?
6. How long is the morning session? The afternoon session?
7. How long are the two sessions together?
8. How long are the two sessions, not counting recess times?
9. If a boy from another grade came in and recited in Language, A, Arithmetic, B, and Geography, A, how many minutes would he spend in this room? How many hours?
10. If a girl from another grade recited in this room in Reading, B, Arithmetic, B, Geography, B, and Drawing, how many hours and parts of an hour would she spend in this room?

GROCERY PRICE LIST.

	Cost at Wholesale.	Selling Price.
Mocha coffee, per pound	$ .25	$ .32
Java coffee, per pound	.33	.40
Tea (gunpowder), per pound	.50	.80
Crackers, per pound	.06½	.09
Cinnamon, per pound	.30	.40
Black pepper, per pound	.17	.30
Ivory soap, per 100 bar box	4.00	per bar .04
Fels-naphtha " " "	4.10	" " .05
Corn meal, per 100 pounds	1.50	per lb. .02½
Salt (100 sacks per bbl.), per bbl.	1.90	2 sacks .05
Graham flour (196 lbs. to a bbl.)	per bbl. 3.90	per lb. .03
Winter wheat flour (196 lbs. to a bbl.)	" 5.15	per bbl. 6.25
Spring wheat flour " " " "	" 6.20	" 7.50
Straight grade flour " " " "	" 4.80	" 6.00
Baking powder, per doz. 1-lb. cans	2.40	per can .25
Canned corn, " " " "	.96	" " .10
Canned tomatoes " " " "	1.44	" " .15
Canned peaches, " " " "	2.28	" " .25
Canned peas " " " "	1.68	" " .20
Canned salmon " " " "	2.28	" " .24

NOTE: Prices of groceries change from time to time and are different in different places. Make problems using the prices in your local papers. The following problems use the price list here given.

One Saturday a grocer put up the following orders:

1. 3 pounds Mocha coffee; 2 pounds gunpowder tea; ¼ pound cinnamon; ½ pound black pepper; ½ dozen bars Ivory soap; 10 pounds corn meal; 4 sacks of salt. What was the amount of this bill?
2. One barrel straight grade flour; 2 cans baking powder; ½ doz. cans each of corn, tomatoes, peaches, peas, and salmon. What was the amount of this bill?
3. For Mr. M. E. Potter:

   One barrel spring wheat flour; 100 pounds corn meal; 20 sacks of salt; 40 pounds of Graham flour; and 100 bars of Fels-naphtha soap. What sum will pay Mr. Potter's bill if the grocer reduces it 5¢ on each dollar?

1. For Mr. E. G. Smith:
   One barrel spring wheat flour; 30 pounds Graham flour; ½ dozen cans baking powder; 2 pounds cinnamon; 3 pounds crackers; 50 sacks salt. What was the amount of Mr. Smith's bill? How much did the grocer gain?
2. For G. A. Tanby:
   2 pounds gunpowder tea; 50 pounds corn meal; 50 pounds Graham flour; 4 cans tomatoes; 3 cans peaches; 5 cans salmon. What was the amount of Mr. Tanby's bill? What did the grocer gain?
3. For G. W. Williams:
   5 pounds Java coffee; 3 pounds tea; 4 pounds crackers; 1 dozen bars Fels-naphtha soap; one barrel winter wheat flour; ¼ dozen cans baking powder; ½ dozen cans peas; ½ dozen cans salmon. What was the amount of Mr. Williams' bill? How much did the grocer gain?
4. The following list of goods would cost the grocer how much?
   50 pounds cinnamon; 25 pounds black pepper; 3 boxes Ivory soap; 2 barrels salt; 6 barrels spring wheat flour; 1 dozen cans baking powder.
5. How much money would the grocer receive for the list in problem 4?
6. How much would the grocer gain from selling the list in problem 4?
7. The following list of goods would cost the grocer how much?
   One barrel Graham flour; one barrel spring wheat flour; one barrel winter wheat flour; one barrel straight grade flour; 3 dozen cans baking powder; 2 dozen cans each of corn, tomatoes, peaches, peas, and salmon.
8. How much money would the grocer gain from selling the list in problem 7?

Boys' Clothing		Girls' Clothing	
For Summer		For Summer	
Suit	$5.00	Hat	$2.25
Cap	.25	Tam O'Shanter	2.00
Jersey	.85	Cambric, 6 yd. @ (at)	15¢
Tennis slippers	.75	Dimity, 7 yd. @	25¢
Underwear	.25	Calico, 9 yd. @	8⅓¢
Stockings	.25	Gloves (a pair)	$1.00
Neckties	.25	Tennis slippers	.75
		Ribbon, 5 yd. @	.15
For Winter		For Winter	
Suit	$6.50	Serge, 5 yd. @	12½¢
Overcoat	5.00	Cloak	$9.50
Shoes	2.00	Shoes	2.00
Hat	1.25	Hat	2.00
Cap	.75	Rubbers	.75
Rubbers (a pair)	.75	Ribbon, 3 yd. @	18¢
Sweater	.90	Muslin, 10 yd. @	12½¢
Handkerchiefs (one doz.)	.65	Embroidery, 4 yds. @	25¢
Mittens	.48	Handkerchiefs (1 doz.)	75¢
Underwear (a suit)	.47	Gingham, 10 yd. @	14¢
Stockings	.35	Calico, 8 yd. @	7¢
Neckties	.35	Mittens (a pair)	45¢
		Gloves (a pair)	$1.25

1. School supplies for one year cost $4.75 for each of a family of six children. What was the cost for all six children?
2. There was bought one month for a boy each item in the above list of Boys' Clothing for summer. What was the whole cost? What would have been the cost for 4 boys?
3. In October each item in the list of Boy's Clothing for winter was bought for a boy. What was the whole cost? What would it have been for 3 boys?
4. Each item in the list of Girls' Clothing for summer was bought for a girl. What was the whole cost? What would it have been for 3 girls?
5. Make other problems from these lists, such as the cost for a family of 2 boys and 3 girls for clothing for winter, for summer; the cost of 2 pair of shoes, 2 hats, 2 pairs rubbers, etc., for cash.

1. How many yards of carpet will be needed to cover a floor 27 feet long and 24 feet wide?
2. A dog-kennel that is $4\frac{1}{2}$ feet high, 2 feet wide, and 4 feet long, contains how many cubic feet?
3. How many feet of fence will be needed to fence a garden 36 yards long and 27 yards wide?
4. How many books, each filling a space of 96 cubic inches, can be packed in a box containing 4608 cubic inches?
5. Add:

7026	6726	6728	6724
7968	9872	9739	3072
9872	6879	8725	5192
9763	8979	9734	6789
8429	7269	2459	1978

6. Subtract:

4072	6720	6729	3072
3987	5987	5989	1998

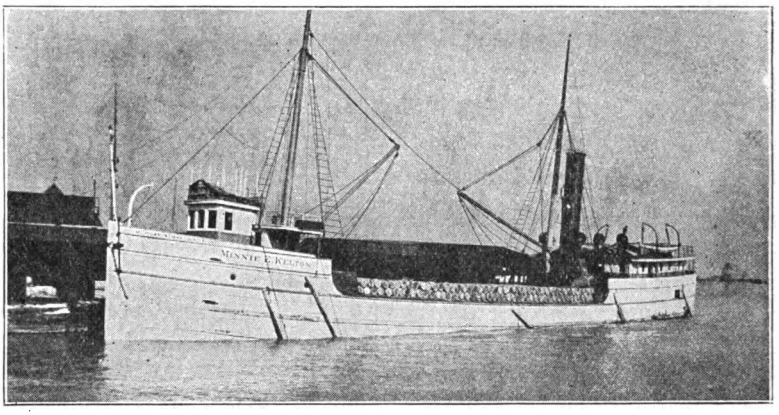
7. Multiply:

4276	6725	7268	8796
36	98	49	57

8. Divide:

$27\overline{)24516}$	$98\overline{)9702}$	$47\overline{)3055}$
$65\overline{)2015}$	$90\overline{)2250}$	$85\overline{)9726}$

9. Anson earned \$4.25 each week for $14\frac{1}{2}$ weeks. How much did he earn in that time?
10. Louise bought 14 yards of cloth at 92¢ a yard, 9 yards of ribbon at 45¢ a yard and a piece of lace at 70¢. She gave in payment a 20-dollar bill. How much change should she receive?



SHIPPING SALT ON LAKE MICHIGAN.

The Kelton is a steamboat engaged in carrying salt between Manistee, Michigan, and Chicago, Milwaukee, and South Chicago. Look up all these places on a map.

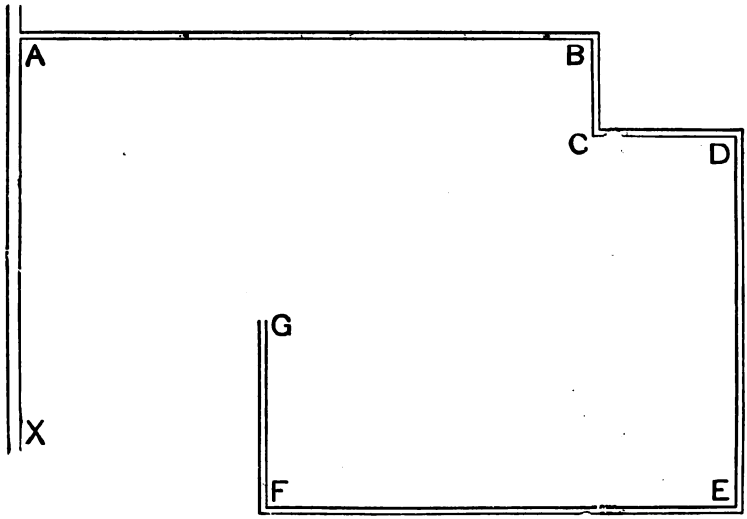
1. The Kelton left Chicago at 3:30 Monday afternoon for Manistee, 176 miles from Chicago. The boat reached Manistee at 7:30 Tuesday morning. How many hours did it take? How many miles an hour did the boat go?
2. At Manistee, the boat was loaded with 6,500 barrels of salt. The cost of loading was $1.00 per hundred barrels, and it took 7 hours to load. At what hour was the loading completed and what was the cost of loading per hour, if loading began as soon as the boat reached Manistee?
3. The boat left for Milwaukee, 88 miles from Manistee, at 2:30 Tuesday afternoon, and reached Milwaukee at 12:30 Wednesday morning. How long did it take and how many miles an hour did the loaded boat run?
4. The unloading at Milwaukee began at 7 o'clock Wednesday a. m. and it took 10 hrs. An hour was taken for dinner. How long since the boat left Chicago?

1. Measure these two lines. Suppose them to be drawn to the scale of 1 inch to 3 feet.
2. What does the short one represent?
3. How many times the short line is the long one?
4. If the short line represents 1 yard, how many yards does the long one represent?
5. If the short line represents 3 feet, how many feet does the long one represent?
6. Name the distance which the long line represents.
7. How many feet in a rod?
8. How many yards in a rod?
9. How many feet in a yard?
10. How many inches in a foot?
11. 320 times what the long line represents is a mile.
12. How many yards in a mile?
13. How many feet in a mile?
14. How many rods in a mile?
15. A boy walks 60 rods. How many yards does he walk? How many feet?
16. A lot 6 rods wide is divided into 2 equal lots. How many feet wide is each lot?
17. A lot is 3 rods wide and 6 rods long. How many yards around it?
18. A bridge is 8 rods long and 2 rods wide. How many feet long and wide is it?
19. A rope 12 rods long is wound into coils, each coil using 6 feet of rope. How many coils are there?
20. How many rods around a farm 2 miles square?
21. How many rods around a farm 3 miles square?
22. A lot 3 rods long is how many feet long?
23. A horse trotted a mile in 3 minutes. How many feet was that per second?

1 foot	1 yard	1 rod	1 mile
12 inches	3 feet	5½ yards	320 rods
	36 inches	16½ feet	1760 yards
			5280 feet

1. A block is 18 rods wide and 22 rods long. How many yards is it around the block? How many feet?
2. A boy lives 64 rods from school. If he goes home at noon how many yards does he travel in a school week?
3. A man lives 2½ miles from his office. He goes to his office each day. How many rods does he travel from Monday morning until Saturday night?
4. A lot is 82½ feet wide and 165 feet long. What is the cost of fencing it at 18¢ a yard? At 75¢ a rod?
5. The rails on a railroad are 2 rods long. How many rails are there in a mile of railroad track?
6. It costs 85¢ a linear foot for making a street. What will be the cost of a quarter of a mile of such a street?
7. A boy rode 7⅛ miles on his wheel. How many rods did he ride?
8. It is 38 yards west from the door of John's house to the school. If he went to the store 45 yards east and then to school, how many yards did he walk? How many feet?
9. How many yards of border will be required for a room 21 feet long and 18 feet wide?
10. The tire of a wheel measures 6 feet. How many revolutions will it make in going 24 rods?
11. A boy steps 2 feet. How many yards will he step in 30 steps? How many steps will he take in walking a mile? In walking ½ a mile? In walking ¼ of a mile?
12. If there are 8 blocks in a mile, how many feet are there in a block?
13. A field is ½ a mile square. How many miles will a man travel in going around the field?

1. This line is drawn to a scale of 1 inch to the mile. A man goes from C to A and returns to B. How many miles has he traveled?
2. From B he goes to C and returns to B. How many miles has he traveled?
3. From B he goes to A and back to B. How many rods has he traveled?
4. Suppose the line to be drawn to a scale of 8 rods to 1 inch. How many yards from A to B? From B to C? From A to C?
5. John lives at B, Ned at A and the school-house is at C. John goes to Ned's house in the morning, then to school, and home in the evening. How many rods has he traveled?
6. The next day Ned goes to school and John is not there. He goes back to John's home and they go back to school together and each returns home in the evening. How many rods has Ned traveled? How many yards?
7. Let each boy count the number of steps to his home from school, write it down and the next day find how many feet the distance is if his steps have been 2 feet long. If he steps $1\frac{1}{2}$ feet. Tell whether it is nearer a mile, $\frac{1}{2}$ a mile, $\frac{1}{4}$ of a mile or $\frac{1}{8}$ of a mile.
8. How many feet in $\frac{1}{2}$ a mile? $\frac{1}{4}$ of a mile? $\frac{1}{8}$ of a mile?
9. 2 boys start out from home and walk in opposite directions. They take 8 steps to the rod. How many rods apart are they when they have each taken 80 steps?
10. Is the distance they are apart nearest to $\frac{1}{4}$, $\frac{1}{2}$ or to a mile?
11. A boy takes 80 steps of 2 feet each in a minute. How far will he walk in 15 minutes? Is the distance nearer to $\frac{1}{4}$ or $\frac{1}{2}$ a mile?



The above is a map of a country road starting from the street A—X, and drawn to a scale of one inch to four miles.

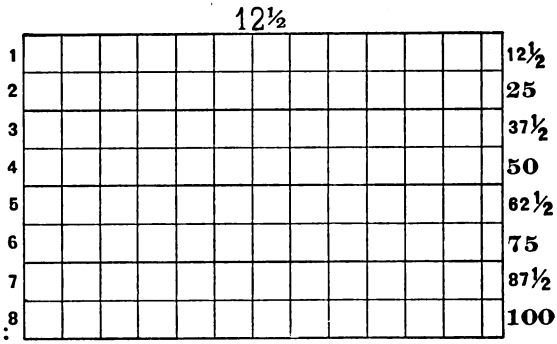
1. How many miles is it from the street to B? To D? To G?
2. How many miles is it from B to G? From D to G?
3. How far is the road B C from the street? How far is D E?
4. How far is the road F G from the road D E?
5. How far is the road F G from the street?
6. How far, in a straight line, is the road A B from the road F E?
7. How far is the end of the road at G from the nearest point of the street?
8. How far is G from the nearest point in the road A B?
9. The distance from B to C is what part of the distance from F to G? What part of D to E? What part of C to D? What part of A to B? What part of D to F?
10. The distance from F to G is what part of the distance from A to B? What part of the distance from D to E?
11. The distance from C to D is what part of the distance from A to B? What part of the distance from F to G?

(Call one inch on the map on the opposite page one-half a mile.)

1. How far is it from A to B? From A to C? From A to D? From B to C? From E to F? From E to G?

(Call one inch on the map on the opposite page one-third of a mile.)

2. How far is it from A to B? From A to C?
3. If a man can walk from A to B in 15 minutes, how long will it take him at the same rate to walk from D to E?
4. If the wheels of a bicycle turn twice around in going one rod, how many times will they turn in going six miles?
5. John rides on his new King bicycle $1\frac{1}{2}$ miles in 8 minutes; Harry rides at the same speed for 5 minutes. How many more rods does John ride than Harry?
6. There are in a room 5 windows 9 feet high. How many yards of material of single width will be required to make curtains for the windows, making 2 curtains for each window? What will be the cost at 6¢ a yard?
7. The windows in a school room are 7 feet high and there are 4 of them. How many yards of material will be required for one curtain at each window if 1 foot is allowed extra for each curtain? What will be the cost of the material at 25¢ a yard?
8. Each step in the staircase is 6 inches high and 1 foot wide. How many feet of stair carpet will be required if there are 12 steps? What will be the cost of the carpet at 75¢ a yard?
9. In a library $35\frac{1}{2}$ feet long and $23\frac{1}{2}$ feet wide, there are book shelves on one side and one end of the room. How many feet of boards, in length, will be required to make 5 of these shelves?
10. A pile of 10 blocks is placed 6 yards from a basket. If a child starts at the blocks and carries 1 at a time to the basket until he has carried all the blocks, and returns, how far will he have walked?



1. Add:

$12\frac{1}{2}$	$12\frac{1}{2}$	$12\frac{1}{2}$	$12\frac{1}{2}$	$12\frac{1}{2}$	$12\frac{1}{2}$	$12\frac{1}{2}$
$12\frac{1}{2}$	$12\frac{1}{2}$	$12\frac{1}{2}$	$12\frac{1}{2}$	$12\frac{1}{2}$	$12\frac{1}{2}$	$12\frac{1}{2}$
	$12\frac{1}{2}$	$12\frac{1}{2}$	$12\frac{1}{2}$	$12\frac{1}{2}$	$12\frac{1}{2}$	$12\frac{1}{2}$
		$12\frac{1}{2}$	$12\frac{1}{2}$	$12\frac{1}{2}$	$12\frac{1}{2}$	$12\frac{1}{2}$
			$12\frac{1}{2}$	$12\frac{1}{2}$	$12\frac{1}{2}$	$12\frac{1}{2}$
				$12\frac{1}{2}$	$12\frac{1}{2}$	$12\frac{1}{2}$
					$12\frac{1}{2}$	$12\frac{1}{2}$
						$12\frac{1}{2}$

2. $12\frac{1}{2} \times 2 =$ _____. $12\frac{1}{2} \times 6 =$ _____.
   $12\frac{1}{2} \times 3 =$ _____. $12\frac{1}{2} \times 7 =$ _____.
   $12\frac{1}{2} \times 4 =$ _____. $12\frac{1}{2} \times 8 =$ _____.
   $12\frac{1}{2} \times 5 =$ _____.
3. $25 \times 2 =$ _____. $25 - 12\frac{1}{2} =$ _____.
   $25 \times 3 =$ _____. $50 - 12\frac{1}{2} =$ _____.
   $25 \times 4 =$ _____. $75 - 12\frac{1}{2} =$ _____.
   $50 \times 2 =$ _____. $100 - 12\frac{1}{2} =$ _____.
4. 25 is what part of 50? Of 75? Of 100?
   50 is what part of 75? Of 100?
   75 is what part of 100?
5. $12\frac{1}{2}$ is what part of 25? Of 50? Of 75?
   $12\frac{1}{2}$ is what part of 100?
6. How many times $12\frac{1}{2}$ is $37\frac{1}{2}$? $62\frac{1}{2}$? $87\frac{1}{2}$?
7. What part of 100 is $37\frac{1}{2}$? $62\frac{1}{2}$? $87\frac{1}{2}$?

1. A woman sold 4 dozen eggs at $12\frac{1}{2}¢$ a dozen. How much did she get for them?
2. What is the cost of 5 pounds of butter at $12\frac{1}{2}¢$ a pound?
3. How many $12\frac{1}{2}¢$ in a dollar? In $\frac{1}{4}$ of a dollar? In a half dollar? In $75¢$?
4. A boy bought a dozen little chickens at $12\frac{1}{2}¢$ each. The feed cost him $75¢$ and he sold the chickens when they were grown at $25¢$ each. How much did he make in the chicken business?
5. A farmer hired a boy to watch his corn-field and promised him $12\frac{1}{2}¢$ for every 3 squirrels and $12\frac{1}{2}¢$ for every 5 crows that he killed. At the end of a week the boy turned in 6 squirrels and 10 crows. How much money should the farmer pay him?
6. A woman bought 10 yards of ribbon at $12\frac{1}{2}¢$ a yard and 8 yards of silk at $87\frac{1}{2}¢$ a yard. What was the cost of the ribbon? Of the silk? Of both together?
7. A boy bought a ball for $12\frac{1}{2}¢$, a bat for $25¢$ and a glove for $37\frac{1}{2}¢$. How much did he pay for his base-ball outfit?
8. A girl bought a doll for $25¢$, a tablet and pencil for $12\frac{1}{2}¢$ and a book for $37\frac{1}{2}¢$. How much change should she receive if she gave the storekeeper $1?
9. A book-seller bought 5 books at $12\frac{1}{2}¢$ each, 8 boxes of paper at $12\frac{1}{2}¢$ each and 7 dozen pencils at $12\frac{1}{2}¢$ a dozen. What was the cost of the whole?
10. A hall is $12\frac{1}{2}$ feet wide and 6 times as long. How long is it?
11. A board is $12\frac{1}{2}$ inches wide and 7 times as long. How many inches long is it?
12. A boy bought 3 dozen eggs for $\frac{3}{8}$ of a dollar, and sold them for $\frac{3}{4}$ of a dollar. What part of a dollar did he gain? How many cents a dozen did he gain?

1. A clerk sold 1 piece of silk cord $4\frac{1}{2}$ feet long, another $7\frac{1}{2}$ feet long. How many yards did he sell in all?
2. A man wishes to put 2 rows of wire above a fence 12 rods long. How many feet of wire does he need?
3. How many yards of carpet are needed to lay one width in a hall $22\frac{1}{2}$ feet long and on a flight of 16 stairs, each step requiring $1\frac{1}{2}$ feet of carpet?
4. John rides 12 miles, his brother $\frac{3}{4}$ as far. How many rods does his brother ride?
5. A field is 160 rods long and 80 rods wide; how many feet of wire will enclose it twice?
6. A man left home and drove 5 miles east; turned and drove 1,000 rods back. How far was he from home?
7. The hall of a hotel is 14 yards long and $16\frac{1}{2}$ feet wide. How many feet of border will be required to go around the walls?
8. How many boards 12 feet long will make a fence 1 mile long, if there are 3 rows of boards?
9. One walk is 150 feet long, a second 80 feet long, and a third 240 feet. What is the length in yards of all together?
10. How many miles long is a track having on 1 side 352 rails, each 30 feet long?
11. A street-car company lays 7 miles of track, $\frac{1}{4}$ of it running east and west, the rest north and south. How many rods of track are there in all? How many running each direction?
12. A boy walked 2 miles, taking steps 2 feet long. How many steps did he take?
13. In building a fence around a field $\frac{3}{4}$ of a mile long and $\frac{1}{2}$ of a mile wide, a farmer used old material for 2,250 yards, and purchased the rest. How many yards of fencing did he buy?

1. A horse can go 1 mile in 6 minutes. How many rods can he go in an hour?
2. A carriage wheel measures 12 feet around the outside. How many times will it turn around in going 3 miles? In going 5 miles?
3. A wheel is 10 feet around the outside. How many yards will it move in going around 120 times on the ground?
4. A lot is 23 yards wide. How many rods will a man walk in crossing the lot 8 times?
5. A boy's top-string is 2 yards long, he cuts from it a piece 18 inches long. What is the length in feet of the remaining part?
6. A mile of gas pipe is laid at $5 a rod. What is the cost of laying?
7. A block is 18 rods wide and 24 rods long. How many steps of 2 feet in length will a boy take in going around it once?
8. A street car goes 10 miles in an hour. At the same rate, how many rods will it go in 15 minutes?
9. At 25¢ a foot, what will be the cost of 4 rods and 1 foot of hose?
10. A boy starts from his home and takes 80 steps of 2 feet each in a minute. He walks at that rate as far as he can go and return in 10 minutes. How far was he from home when he turned to go back?
11. A man walked 4 miles an hour and a boy walked 2 miles an hour. They started in the same direction at the same time. How many rods apart were they in 15 minutes?
12. What will be the cost of a ditch half a mile long at $1.25 a rod?
13. What is the distance around a lot which is 50 yards and 2 feet long and 8 yards and 1 foot wide?

1. Give the number of

12's in			3's in			11's in	
24	30	84	12	6	36	77	110
42	144	66	24	27	15	55	99
18	132	108	10	22	21	132	33
96	60	72	18	30	14	66	121
48	36	120	9	27	33	88	44

2. $12 \times 4 =$ ____. $12 \times 5 =$ ____. $3 \times 11 =$ ____.
   $12 \times 9 =$ ____. $12 \times 3 =$ ____. $3 \times 12 =$ ____.
   $12 \times 7 =$ ____. $12 \times 12 =$ ____. $3 \times 5 =$ ____.
   $12 \times 10 =$ ____. $12 \times 6 =$ ____. $3 \times 8 =$ ____.
   $12 \times 8 =$ ____. $12 \times 11 =$ ____. $3 \times 9 =$ ____.

3. $12 \times 2\frac{1}{2} =$ ____. $12 \times 10\frac{1}{4} =$ ____. $3 \times 8\frac{1}{3} =$ ____.
   $12 \times 5\frac{1}{4} =$ ____. $12 \times 9\frac{1}{3} =$ ____. $3 \times 5\frac{1}{3} =$ ____.
   $12 \times 7\frac{1}{3} =$ ____. $12 \times 3\frac{1}{2} =$ ____. $3 \times 7\frac{1}{3} =$ ____.
   $12 \times 6\frac{1}{4} =$ ____. $12 \times 12\frac{1}{4} =$ ____. $3 \times 9\frac{1}{3} =$ ____.
   $12 \times 8\frac{1}{2} =$ ____. $12 \times 4\frac{3}{4} =$ ____. $3 \times 12\frac{1}{3} =$ ____.

4. $5\frac{1}{2}$ is what part of 11? What part of $16\frac{1}{2}$? Of 22?

5. $5\frac{1}{2} \times 2 =$ ____. $16\frac{1}{2} \times 3 =$ ____. $11 \times 8 =$ ____.
   $5\frac{1}{2} \times 4 =$ ____. $16\frac{1}{2} \times 6 =$ ____. $11 \times 9 =$ ____.
   $5\frac{1}{2} \times 7 =$ ____. $16\frac{1}{2} \times 4 =$ ____. $11 \times 12 =$ ____.
   $5\frac{1}{2} \times 8 =$ ____. $16\frac{1}{2} \times 2 =$ ____. $11 \times 4 =$ ____.
   $5\frac{1}{2} \times 6 =$ ____. $16\frac{1}{2} \times \frac{1}{3} =$ ____. $11 \times 7 =$ ____.
   $5\frac{1}{2} \times 9 =$ ____. $16\frac{1}{2} \times \frac{2}{3} =$ ____. $11 \times 10 =$ ____.
   $5\frac{1}{2} \times 3 =$ ____. $16\frac{1}{2} \times 1\frac{1}{3} =$ ____. $11 \times 6 =$ ____.
   $5\frac{1}{2} \times 10 =$ ____. $16\frac{1}{2} \times 2\frac{2}{3} =$ ____. $11 \times 11 =$ ____.

6. $\frac{1}{2}$ of 320 = ____. $\frac{1}{4}$ of 320 = ____.
   $\frac{1}{8}$ of 320 = ____. $\frac{1}{16}$ of 320 = ____.
   $\frac{1}{10}$ of 320 = ____. $\frac{1}{32}$ of 320 = ____.

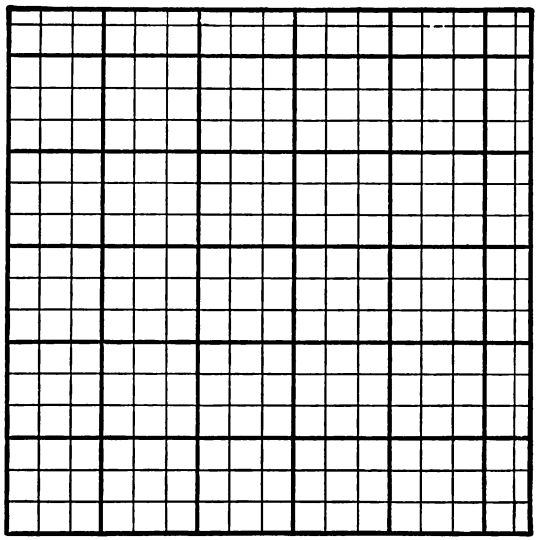
7. $2 \times 320 =$ ____. $3 \times 320 =$ ____.
   $5 \times 320 =$ ____. $4 \times 320 =$ ____.

8. What part of 320 is 40? What part is 80? 20?

1. If 1 cord of wood cost $\$5\frac{1}{2}$, how much will 4 cords cost?
2. How many 12 pound packages of sugar can be made from 72 pounds?
3. How many bins holding $5\frac{1}{2}$ bushels can be filled from $16\frac{1}{2}$ bushels of grain?
4. A man walked $16\frac{1}{2}$ miles 1 day and $5\frac{1}{2}$ miles the next. How many miles did he walk in all? How many miles farther the first day than the second?
5. At $\$5\frac{1}{2}$ a ton, how many tons of coal can be bought for $22?
6. 11 men received $132 for digging a ditch. They shared the money equally. What did each one receive?
7. A farmer bought 16 sheep at $3 each and sold them at the rate of 3 for $12. What was the entire cost? How much did he receive? What was his gain?
8. A flag staff 48 feet high was broken into 2 pieces, 1 piece being 3 times as long as the other. What was the length of each piece?
9. What is the cost of a bale of cotton containing 400 pounds, at $5\frac{1}{2}¢$ a pound? At $7¢$ a pound?
10. From a bin holding 77 bushels, 55 bushels were taken out. How many bins holding $5\frac{1}{2}$ bushels each can be filled from the remainder?
11. $40 a month is paid by a man for his rent; his other monthly expenses are 7 times as much. What is the amount of his other expenses? Of total expenses?
12. What is the average rate of speed made by a train traveling 320 miles in 8 hours?
13. A grain dealer sold 320 bushels of corn in 40 bushel loads. How many loads did he sell?
14. A bushel of wheat weighs 4 pounds more than a bushel of corn. What is the difference in weight between 80 bushels of each?

1. Draw diagrams on a scale of 3 feet to 1 inch for rooms of the following dimensions:
   12 feet long and 9 feet wide.
   24 feet long and 18 feet wide.
   30 feet long and 27 feet wide.
   33 feet long and 21 feet wide.
   15 feet long and 12 feet wide.
   21 feet long and 12 feet wide.
   27 feet long and 15 feet wide.
   24 feet long and 15 feet wide.
   Give perimeters in feet. In yards.
2. Draw diagrams on a scale of 3 yards to 1 inch, for lots of the following dimensions:
   15 yards long and 12 yards wide.
   18 yards long and 15 yards wide.
   12 yards long and 6 yards wide.
   15 yards long and 9 yards wide.
   24 yards long and 12 yards wide.
   33 yards long and 15 yards wide.
   21 yards long and 12 yards wide.
   27 yards long and 12 yards wide.
   Give perimeters in yards. In feet.
3. Draw diagrams on a scale of $\frac{1}{8}$ mile to $\frac{1}{2}$ inch, for fields of the following dimensions:
   $\frac{1}{2}$ mile long and $\frac{1}{4}$ mile wide.
   1 mile long and $\frac{1}{2}$ mile wide.
   2 miles long and $1\frac{1}{2}$ miles wide.
   $1\frac{1}{2}$ miles long and $\frac{1}{2}$ mile wide.
   $1\frac{1}{4}$ miles long and 1 mile wide.
   $\frac{3}{4}$ mile long and $\frac{1}{2}$ mile wide.
   $1\frac{1}{2}$ miles long and $\frac{3}{4}$ mile wide.
   $1\frac{1}{4}$ miles long and $\frac{3}{8}$ mile wide.
   Give perimeters in miles. In rods.

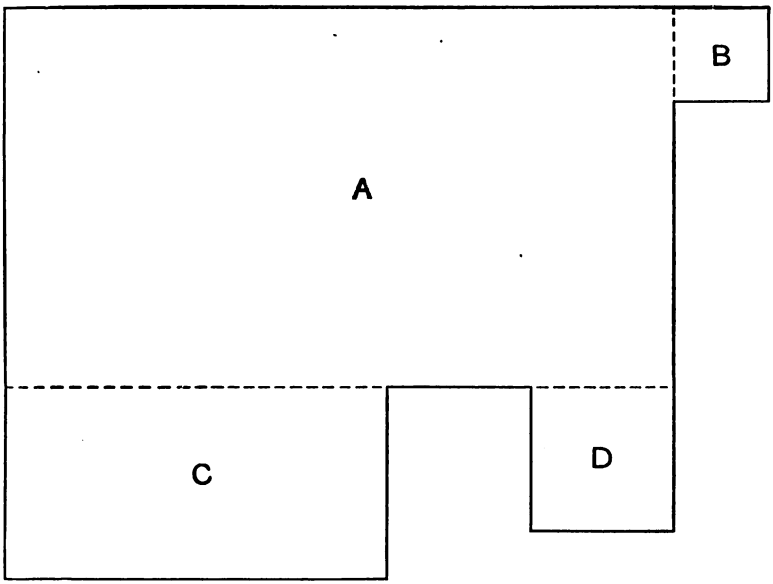
PART THIRD.



This is the plan of a square garden drawn to a scale of ½ an inch to 1 yard.

1. Measure the figure. What is its length? Its width?
2. How many feet long would the lot be? How many feet wide?
3. Count the number of square yards. By what name have we known 16½ feet? By what name have we known 5½ square yards?
4. If the figure were 320 times as long and wide as represented, how long would it be? How wide?
5. What would you call such a square figure?
6. Referring to figure A on page 110, if each square represents 1 square inch, how long would the side of this figure be? How many rows of 12 square inches are in it? How many square inches would it contain?

1. How many square inches in a square foot? (See p. 185.)
2. How many square feet in one row on one side of a square yard? How many rows of the same number of square feet? How many square feet in a square yard?
3. How many square yards in a square rod? (See p. 185.)
4. How many yards in 2 square rods?
5. How many yards in one-half of a square rod?
6. How many yards in $2\frac{1}{2}$ square rods?
7. A garden contained $2\frac{1}{2}$ square rods and was 1 rod wide. How long was it?
8. A lot contained 20 square rods. How many square yards in it?
9. A lot containing 80 square rods was sold for $240. How much was that a square rod?
10. A lot containing 160 square rods was sold at the rate of $3 a square rod. How much was received for it?
11. A street in a village was 6 rods wide and 40 rods long. How many square rods did it contain? How many square yards?
12. A street 250 rods long contained 10 blocks. Not counting crossings, how many rods was that for each block? How many yards for each block? How many feet?
13. At $5 a front foot, how much will it cost to pave a street in front of a lot that is 33 feet wide?
14. If the paving in problem 14 extends to the middle of a street 3 rods wide from curb to curb, how many square feet are provided for in front of this lot?
15. A street is 28 blocks long. Each block, including crossing, is 15 rods long and 5 rods wide. How many square rods does the street contain?
16. A field 16 rods long and 10 rods wide contains how many square rods? What is its perimeter in rods? In yards? In feet?



The above is a plan of a garden drawn to a scale of 12 feet to 1 inch.

1. To find the area of the entire garden, first divide as indicated by the dotted lines.
2. The area of B is equal to how many square feet? How many square yards?
3. Find the area of D in square feet. In square yards. The area of C.
4. Find the area of A in square feet. In square yards.
5. Find the area of the entire garden in square yards.
6. C is what part of A?
   D is what part of C? Of A?
   B is what part of D? Of C? Of A?
7. If 1 inch on the plan represents 4 yards, what is the area of each section in square yards? In square feet?
8. If 1 inch on the plan represents 8 rods, what is the area of each section in square rods?

Table of Square Measure.

144 sq. in. (square inches) = 1 sq. ft. (square foot).
9 sq. ft. = 1 sq. yd. (square yard).
$30\frac{1}{4}$ sq. yd. = 1 sq. rd. (square rod).
160 sq. rd. = 1 A.
640 A. = 1 sq. mi. (square mile).

1. In 60 A. how many sq. rd.?
2. In 32 sq. rd. how many sq. yd.?
3. In 63 sq. yd. how many sq. ft.?
4. In 37 sq. ft. how many sq. in.?
5. In 56 A. and 13 sq. rd. how many sq. rd.?
6. In 47 sq. rd. and 9 sq. yd. how many sq. yd.?
7. In 37 sq. yd. and 7 sq. ft. how many sq. ft.?
8. In 134 sq. ft. and 47 sq. in. how many sq. in.?

9. Add:

60 A. 15 sq. rd.	16 sq. rd. 4 sq. yd.
137 A. 40 sq. rd.	47 sq. rd. 8 sq. yd.
256 A. 56 sq. rd.	64 sq. rd. 15 sq. yd.
186 A. 49 sq. rd.	32 sq. rd. $3\frac{1}{4}$ sq. yd.

10. Add:

14 sq. yd. 2 sq. ft.	4 sq. ft. 43 sq. in.
11 sq. yd. 4 sq. ft.	6 sq. ft. 84 sq. in.
$4\frac{1}{4}$ sq. yd. 3 sq. ft.	7 sq. ft. 17 sq. in.

11. Subtract:

18 sq. ft. 56 sq. in.	16 sq. yd. 7 sq. ft.	18 A. 86 sq. rd.
5 sq. ft. 13 sq. in.	11 sq. yd. 3 sq. ft.	5 A. 17 sq. rd.

12. Multiply:

6 sq. ft. 24 sq. in. × 6	6 sq. yd. 3 sq. ft. × 3	3 A. 80 sq. rd. × 2

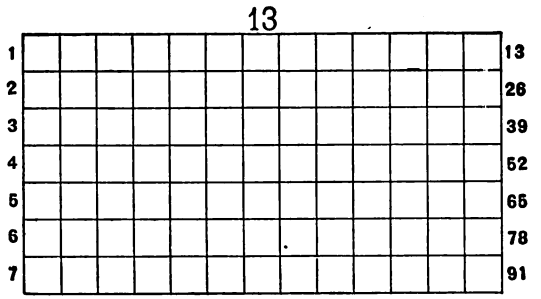
1. A board is 13 feet and 4 inches long and 12 inches wide. What is the area of 1 side in square feet?
2. A house 24 feet wide covers 72 square yards of ground. How long is it and what is the distance around it?
3. The blackboards in a schoolroom are equal to 1 blackboard 54 feet long and $4\frac{1}{2}$ feet wide. How many square feet of surface in all of the blackboards, and what will it cost to slate them at 36¢ a square yard?
4. How many acres of ground in 4000 square rods?
5. What will a farm 240 rods long and 60 rods wide cost at $35 an acre?
6. A man has 10 acres and 90 square rods. He buys 8 acres and 70 square rods. How much land does he then have?
7. How many square feet in the floor of a room that is 24 feet long and $12\frac{1}{2}$ feet wide? What will it cost to paint the floor at 25¢ a square yard?
8. How many square yards of cloth will it take to cover a table that is 48 inches long and 36 inches wide?
9. The floor of a hall 36 feet long and 6 feet wide is paved with marble blocks 1 foot square. How many blocks did it take to pave the hall?
10. A hall 24 feet long and 6 feet wide is paved with tile 6 inches square. How many tiles were required?
11. A room is 18 feet long, 15 feet wide and 9 feet high. How many square yards in the floor and ceiling. How many square yards in the walls?
12. How many square feet of flooring in a 9 story building which is 55 feet wide and 123 feet long?
13. How many square feet of sidewalk in 9 blocks of 275 feet each, if the sidewalk is 8 feet wide?
14. A building is 150 feet long and $40\frac{1}{2}$ feet wide. How many square yards does it cover?

1. Divide:
   264 by 11, by 21, 31, 41, 51.
   528 by 12, by 22, 32, 42, 52.
   377 by 13, by 23, 33, 43, 53.
   434 by 14, by 24, 34, 44, 54.
   675 by 15, by 25, 35, 45, 55.
   352 by 16, by 26, 36, 46, 56.
2. Divide each of the following numbers by 13, 14, 16, 29, 38, 46, 57, 74, 88, and 97.

118	154	172	120	156	188
213	237	248	253	269	293
3123	3234	3345	3456	3567	3785
4678	5788	6879	7890	8901	8493
9012	8123	7243	6542	5987	9648

3. A man paid \$31.46 for eggs at 13¢ a dozen. How many dozen did he buy?
4. A tank holds 300 barrels of water. When it is $\frac{1}{15}$ full, how many barrels does it hold?
5. In a flock of 1,736 sheep, $\frac{1}{14}$ of the number were lambs. How many lambs were there?
6. A man bought 20 feet of piping for \$6.40. How much per foot did it cost?
7. A man bought 18 yards of cloth for \$36.72. How much did it cost a yard?
8. A man bought 25 pictures, paying for them \$925. If each one cost the same, what was the cost of one picture?
9. A grocer sold 19 pounds of butter for which he received \$4.37. How much per pound did he get?
10. A boy can ride 15 miles an hour on his bicycle. At the same rate how many hours would it take him to ride 5,136 miles?
11. The schoolroom floor contains 1,100 square feet and is 25 feet wide. How long is it?

1. A grain dealer sold 665 bushels of oats in loads of 35 bushels each. How many loads did he sell?
2. A man paid $79.58 for butter at 23¢ a pound. How many pounds did he buy?
3. A lot contains 4,232 square feet and is 23 feet wide. How long is it?
4. If 24 horses cost $1,080, what is the average cost of one?
5. 3,300 bushels of grain were put into 22 bins of equal size. How many bushels in each bin?
6. In laying a railroad 1,200 miles long, one-sixth of it was built over hilly ground, and one twenty-fourth of it over water, the rest ran over level ground. How many miles of railroad in each part?
7. If there are 40 single seats in each room in a schoolhouse, how many rooms will be needed to seat 1,680 pupils? To seat 8,640 pupils?
8. A merchant bought 2 dozen pairs of shoes for $52.80. How much did he pay a pair?
9. How many ponies at $50 each can be bought for $1,000?
10. A bookseller bought 1,485 books. They were packed in 15 boxes with an equal number in each box. How many books were there in each box?
11. A coal dealer shipped 2,916 tons of coal in cars of 18 tons each. How many such cars did he ship?
12. A grocer bought a quantity of butter at 22 cents a pound, and paid for it all $10.56. How many pounds did he buy?
13. How many packages containing 24 ounces each can be made from 15 pounds of tea?
14. A man sells horses at $85 apiece. How many horses must he sell to receive $1,020?
15. How many loads of corn, each 22 bushels, will be needed to fill a crib that holds 264 bushels?



1. $13 \times 2 =$ _____. $13 \times 5 =$ _____.
   $13 \times 3 =$ _____. $13 \times 6 =$ _____.
   $13 \times 4 =$ _____. $13 \times 7 =$ _____.
2. 13 is what part of 26? Of 39? Of 78? Of 65? Of 52? Of 91?
3. $39 + 13 =$ _____. $78 + 13 =$ _____.
   $26 + 13 =$ _____. $65 + 13 =$ _____.
   $52 + 13 =$ _____. $91 - 13 =$ _____.
4. $\frac{8}{13}$ $\frac{9}{13}$ $\frac{11}{13}$ $\frac{7}{13}$ $\frac{6}{13}$ $\frac{12}{13}$ $\frac{10}{13}$ $\frac{5}{13}$

5. How many stripes in our flag?
6. How many red stripes?
7. How many white ones?
8. How many states were there when the number of stars was three times the number of stripes?
9. When will the number of stars be 4 times the number of stripes?
10. 5 times the number of stripes in our flag is the year of the nineteenth century in which the Civil War closed. In what year did the war close?
11. From the Declaration of Independence to the World's Fair in Chicago was 9 times as many years as there are stripes in the flag. How long was it?

In the following problems, the phrase "at the same rate" is understood.

1. 3 pounds of butter cost 75¢. What is the cost of 4 pounds?
2. If 9 barrels of flour cost $45, what is the cost of 7 barrels?
3. 5 acres of land cost $250. What is the cost of 7 acres of land?
4. I received $63 for 9 weeks' work. What should I receive for 12 weeks' work?
5. What is the cost of a dozen chairs if $\frac{1}{4}$ of a dozen cost $12?
6. If I pay 4¢ for 10 marbles, what should I pay for 25 marbles?
7. When eggs sell at 30¢ for 2 dozen, what is the cost of $\frac{1}{3}$ of a dozen?
8. A dozen pairs of boots cost $36. What is the cost of 8 such pairs?
9. When 2 gallons of syrup cost $1.50, what is the cost of 3 quarts?
10. A man receives $1200 a year and spends $45 a month. How much does he save the first 6 months? How much does he spend?
11. A piece of string is 6 lengths of an 18-inch rule. How many feet long is it?
12. A man had on his wagon 30 bushels of wheat, $\frac{2}{3}$ of which he sold at 95¢ a bushel. The remainder he sold at 98¢ a bushel. What did he receive for the entire load?
13. The curtains for a room with 3 windows cost $5. What will they cost for a room with 12 windows?
14. 3 dozen neckties cost $1.80. What is the cost of 4 neckties?
15. A car runs 4 miles in 20 minutes. How far will it run in 3 hours?

NOTE — In plastering, many contractors make no deductions for windows or doors on account of the extra time necessary to do the work carefully around the frames. In all the problems, therefore, on plastering, unless otherwise stated, the walls are counted as solid.

1. A room is 9 feet by 21 feet and 9 feet high. How many square yards in the walls? In the ceiling? What will it cost to plaster the walls and ceiling at 21¢ a sq. yd.?
2. A room is 12 feet square and 10 feet high. What will it cost to plaster the walls and ceiling at 23¢ per sq. yd.?
3. What will be the cost of plastering the walls of a room 9 by 12 feet and 9 feet high at 45¢ a square yard?
4. What will be the cost of plastering the ceiling of a room 24 feet square at 28¢ a square yard?
5. Mr. Jones wishes to plaster the walls and ceilings of 3 rooms. The first room is 9 by 12 feet, the second 12 by 15 feet and the third 15 by 18 feet. The height of each room is 9 feet. What will be the cost of plastering the three rooms at 28¢ a square yard?
6. What would be the cost of carpet a yard wide for the three rooms at 75¢ a yard?
7. The floor of a room contains 324 square feet. One side of it is 4 yards long. How many yards long is the other side?
8. The 4 walls of a square room 8 feet high contain 384 square feet. What is the length and the width of the room?
9. The top of a desk is 2 feet and 6 inches wide and 4 feet long. How many square feet does it contain?
10. What is the length of a wall 12 feet high the area of whose side is 3 times 264 square feet?
11. A room is 10 feet wide and $11\frac{1}{2}$ feet long. A rug on the floor is $2\frac{1}{2}$ yards wide and 3 yards long. How much of the floor is not covered by the rug?

14

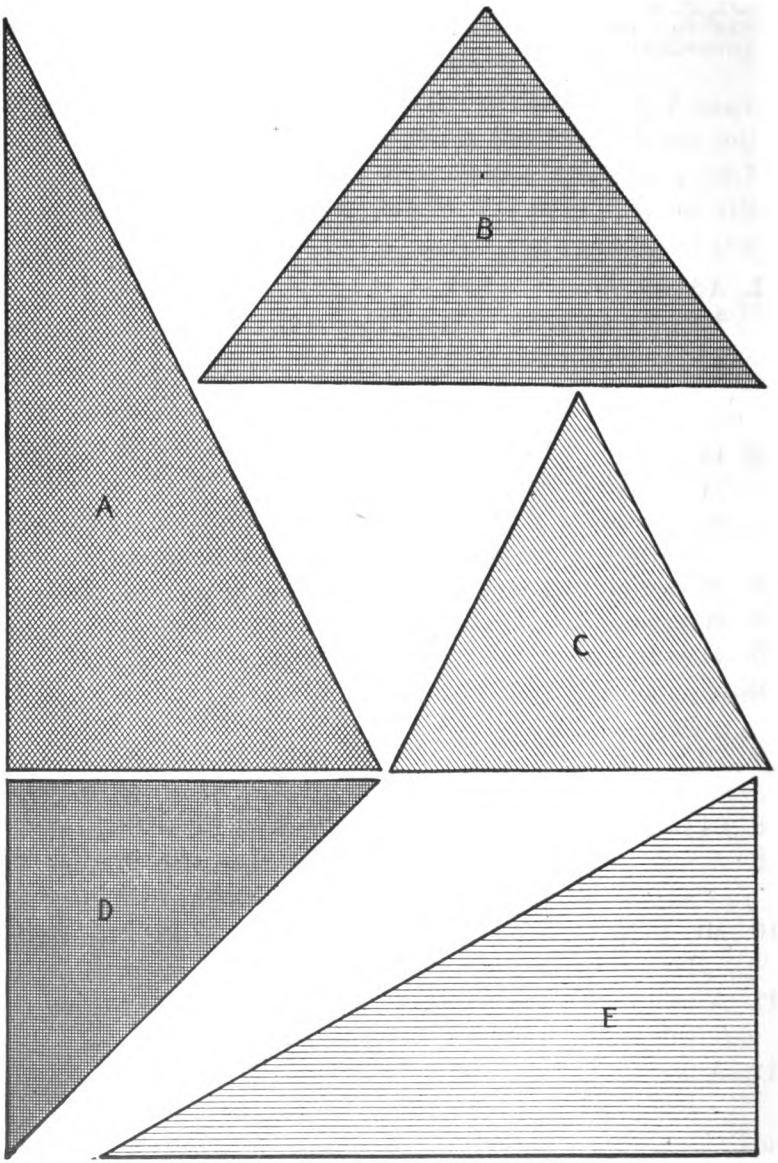
1													14
2													28
3													42
4													56
5													70
6													84
7													98

1. Add:

14	14	14	14	14	28
14	14	28	56	28	28
	28	28	14	56	42

2. $14 \times 3 =$ _____. $14 \times 6 =$ _____. $14\overline{)98}$
   $14 \times 2 =$ _____. $14 \times 7 =$ _____.
   $14 \times 5 =$ _____. $14 \times 4 =$ _____. $14\overline{)70}$

3. 14 is what part of 28? Of 56? 42? 70? 84? 98?
4. How many 28's in 42? 70? 84? 56? 98?
5. 42 is how many 14's? 28's? What part of 56? Of 70?
6. 56 is how many 14's? 28's? 42's? What part of 70? 98?
7. 70 is how many 14's? 28's? 42's? 56's? What part of 98?
8. 84 is how many 14's? 28's? 42's? 56's? 70's?
9. A man fed his horse $1\frac{1}{2}$ pecks of oats each day for 4 weeks. How many bushels of oats did he feed him?
10. Mr. Jones traveled 195 mi. each day for 2 weeks. How far did he travel in the two weeks?
11. A train ran 14 miles in 30 minutes. How far would it run at the same rate in $2\frac{1}{2}$ hours?
12. A piece of ground 1008 ft. wide is divided into 14 equal lots. What is the width of each lot?


A
B
C
D
E

1. Review page 121.
2. How long is the base of the triangle A on the opposite page?
3. What is the altitude of the triangle?
4. Into what rectangle can you change the triangle A?
5. What is the area of this rectangle?
6. What, then, is the area of the triangle A?
7. What rule would you give for finding the area of such a triangle?
8. Measure the triangles B, C, D and E, and give the dimensions in each case of the rectangle into which you can change the triangle.
9. What is the area of each of these rectangles?
10. What, then, is the area of the triangle B? Of the triangle C? Of E?
11. If you were to make a rectangle whose width was the base of A, and whose length was the altitude of A, would you change the largest angle of the triangle?
12. Such an angle we call a right angle and every triangle which has such an angle is called a right-angled triangle.
13. What triangles on the opposite page are right-angled triangles?
14. If an inch of the plan represented a yard, what would be the area of each triangle in feet?
15. Find the area of the following right-angled triangles:

    Base three feet, altitude six feet.

    Base four feet, altitude three feet.

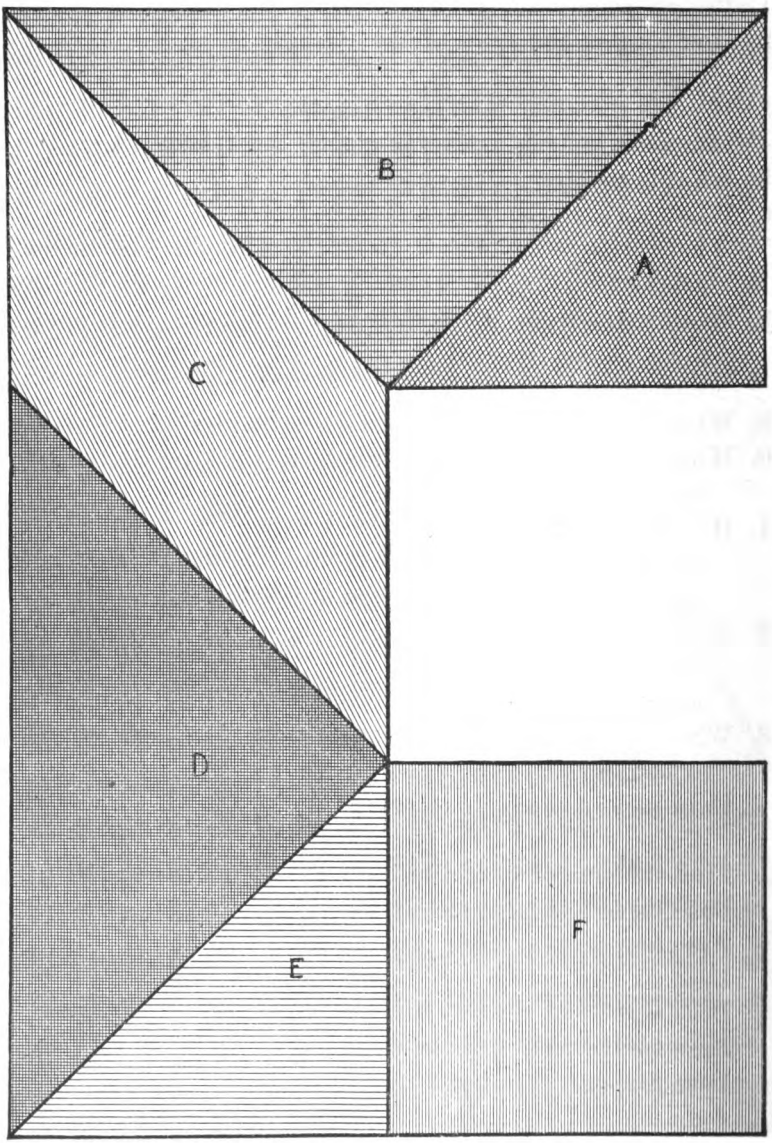
    Base six feet, altitude eight feet.

    Base eight feet, altitude ten feet.

    Base twelve feet, altitude eight feet.

    Base fifteen feet, altitude twelve feet.

    Base ten inches, altitude five inches.


B
A
C
D
E
F

NOTE.—The plan on the opposite page represents a garden, which has been cut into various parts by the walks running through it. The plan is drawn to the scale of 10 feet to an inch.

1. Measure the line around the entire plan and find the length of the path around the garden.
2. From these measurements, what is the area of A?
3. What is the area of B?
4. What is the area of C?
5. What is the area of D?
6. What is the area of E?
7. What is the area of F?
8. How many square feet are there in the entire garden?
9. A is what part of B? C? D? E? F?
10. F is what part of the entire garden?
11. How did you find the area of C?
12. How did you find the area of D?
13. In what other ways beside finding the areas of the triangles could you find the area of the entire garden?

NOTE.—Suppose the plan on the opposite page, representing a piece of land, is drawn to a scale of one inch to 8 rods.

14. What will be the value of A at 25¢ a sq. rd.?
15. What will be the value of B at 30¢ a sq. rd.?
16. What will be the value of C at 28¢ a sq. rd.?
17. What will be the value of D at 27¢ a sq. rd.?
18. What will be the value of E at 26¢ a sq. rd.?
19. What will be the value of F at 29¢ a sq. rd.?
20. How many sq. rds. in the entire field?
21. How many acres?
22. How many sq. yds. in A.?
23. How many sq. ft. in B?
24. How many sq. yds. in C?
25. How many sq. ft. in D?
26. How many sq. yds. in E?
27. How many sq. ft. in F?

1. A woman who raises chickens put 13 eggs under each of 6 hens. The first hatched out all but 1, the second all but 2, the third all but 3, the fourth all but 4, and the others all but 5 each. How many chickens were hatched?
2. How many pigeons will it take to pick up a bushel of corn (56 lbs.) if each one picks up 4 oz.?
3. A man buys 12 tons of hay for $80 and sells it for 60¢ per cwt. How much does he make?
4. An expressman receives $3.25 per day for 30 days. It costs him 30¢ per day to feed his horse. He pays $4.20 for repairs to his wagon. How much has he left?
5. An express company carries 400 packages at 15¢ each, 28 trunks at 50¢ each, and 12 bicycles at 40¢ each. What does it get for them all?
6. There are 40 street cars on one line and each can carry 60 people. How many people will they all carry in 12 round trips if $\frac{1}{2}$ carry their full number each way and the remainder carry 30 persons each way?
7. A baker has 400 loaves of bread. He sells $\frac{3}{4}$ at 5¢ per loaf, 60 loaves at 4¢, and gives the rest away. How much does he get for the bread?
8. How many sheep must there be to produce a ton of wool if the wool from each sheep weighs 4 lbs.? If each sheep produces 5 lbs.?
9. How many balls of kite string will it take to reach $8\frac{1}{2}$ miles if each ball contains 80 yards? 110 yds.?
10. A farmer raised 840 bu. of potatoes on 5 acres of land. What was the value of the average produce of 1 acre at 40¢ per bushel?
11. A man set out 12,000 cabbage plants, but $\frac{1}{8}$ of them died and $\frac{1}{10}$ of the remainder were blighted. What did he receive for the rest at $3 per hundred?

1. An orchard of 600 trees produced 3 bbls. of apples to the tree. The owner sold them at \$1.40 per bbl., but the barrels cost him 25¢ each. What did he get for the apples after paying for the barrels?
2. A peach orchard produced 210 bu. of peaches. If 1 bu. fills 5 baskets, what is the value of the crop at 20¢ a basket?
3. A farmer pays some boys 1¢ per box for picking berries, and the boxes cost him $\frac{1}{4}$¢ each. If he sells 1000 boxes of berries for \$60.00, what is his share of the money?
4. A boy's pay for a week's work at berry-picking at 1¢ per box was \$5.40. How many boxes did he pick daily, on an average, during the six days?
5. A farmer sells 1000 boxes of berries to a city grocer at 6¢ per box. It costs the grocer \$5.00 to get them to the city and he sells them at 8¢ per box. What is his gain?
6. A woman who kept chickens bought 12 bu. of feed for them at 35¢ per bu. She sold 120 doz. eggs at $12\frac{1}{2}$¢ a doz. and 40 chickens at 25¢ each. How much more did she receive than she paid out?
7. How many chickens averaging 5 lbs. each and worth 6¢ per lb. can be bought for \$75?
8. If 15 chickens are worth as much as 1 sheep, and 6 sheep are worth as much as 1 cow costing \$28.80, what is 1 chicken worth?
9. A carpenter builds a fence for \$56. The lumber costs him \$15 and he pays each of three men \$2.75 per day for four days. What is his share of the \$56?
10. A man earns \$1.50 every day he works and pays 50¢ a day for his board. If he only works 16 days during the month of May, how much has he left after paying his board?

BEET-SUGAR PRODUCTION OF THE UNITED STATES.

STATE.	1903.			1902.		
	Factories.	Acres Sown.	Tons Sugar.	Factories.	Acres Sown.	Tons* of Sugar.
New York.....	2	7,000	4,479	2	6,500	2,799
Wisconsin	1	5,800	4,311	1	3,400	3,463
Ohio.....	1	2,500	2,009	1	2,450	1,473
Michigan	20	117,100	57,064	16	98,000	48,848
Minnesota	1	3,800	3,125	1	4,500	3,054
Nebraska	3	11,400	8,669	3	9,980	9,430
Colorado.....	8	52,300	39,566	5	39,449	34,623
Utah	7	18,700	20,670	6	18,600	16,987
Oregon	1	1,800	1,250	1	3,100	2,025
Washington....	1	4,400	2,213	1	2,300	1,641
Idaho.....	1	5,300	3,571			
California.....	7	62,195	60,608	7	71,234	71,120

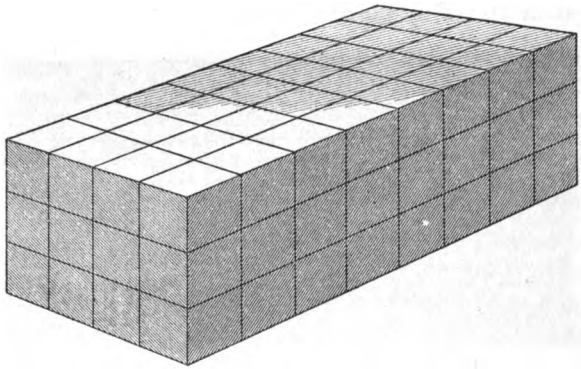
*Ton=the long ton of 2240 pounds.

1. If the two beet-sugar factories of New York in 1903 produced equal amounts, how many tons did each factory produce during that year? How many pounds did each produce during that year?
2. If the seven beet-sugar factories of California in 1902 produced equal amounts, how many tons did each factory produce during that year? How many pounds?
3. If an equal number of acres was sown to produce beets for each factory, how many acres were producing for each factory of Colorado in 1903? In 1902?
4. If an equal number of acres was sown to produce beets for each factory, how many acres were producing for each factory of Michigan in 1903? In 1902?
5. Make other problems on this table comparing the production of different states and their values at current newspaper prices.

A List of Dates of Births and Deaths of Noted Persons.

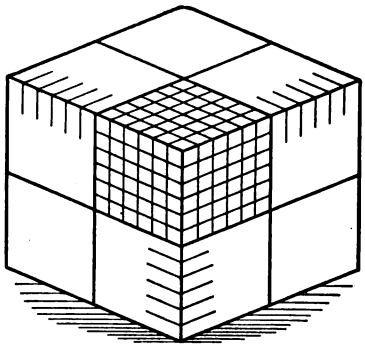
	Born	Died		Born	Died
Paul Revere	Jan. 1, 1735	1818	Andrew Jackson..	Mar. 15, 1767	1845
Benj. Franklin ..	Jan. 17, 1706	1790	Rosa Bonheur ...	Mar. 22, 1822	1899
Wm. McKinley .	Jan. 29, 1843	1901	Hans C. Andersen.	April 2, 1805	1875
James G. Blaine .	Jan. 31, 1830	1893	Washington Irving	April 3, 1783	1859
Abraham Lincoln	Feb. 12, 1809	1865	John Burroughs	April 3, 1837	....
Charles Dickens .	Feb. 7, 1812	1870	U. S. Grant	April 27, 1822	1885
Geo. Washington.	Feb. 22, 1732	1799	Audubon	May 4, 1780	1851
James R. Lowell.	Feb. 22, 1819	1891	Queen Victoria ...	May 24, 1819	1901
Henry W. Longfellow	Feb. 27, 1807	1882	Patrick Henry ...	May 29, 1736	1799

1. What is the month and day of your birth?
2. In what year were you born?
3. How old are you to-day?
4. Find how many years each person in the above table lived.
5. Which was the older, and how much older, William McKinley or James G. Blaine? James Russell Lowell or Henry W. Longfellow? Abraham Lincoln or U. S. Grant?
6. How many years ago (now) was each person born?
7. The birthday of William McKinley occurs how many days after that of Benjamin Franklin?
8. The birthday of Henry W. Longfellow occurs how many days before that of Andrew Jackson?
9. How many days between U. S. Grant's birthday and that of Patrick Henry?
10. How many years, months, and days have passed since Queen Victoria was born?
11. Answer the same question for Benjamin Franklin; James Russell Lowell; Rosa Bonheur.
12. Make problems using the dates of births of pupils in your class.



1. In the first layer of blocks in this solid, how many rows of 4 blocks each? How many blocks in the layer? How did you find this? In all 3 layers, or the entire solid, how many blocks are there? How did you find this? How then do you find the number of cubic feet in any square-cornered solid?
2. How many inch cubes are there in a block 2 inches long, 2 inches wide and 1 inch high? See page 2 How many inch cubes are there in a block 4 inches long, 2 inches wide and 1 inch high?
3. How many inch cubes are there in a block 6 inches long, 4 inches wide and 1 inch high? How many inch cubes are there in one row? How many of these rows are there in the block?
4. How many cubic inches are there in a box that is 4 inches long, 3 inches wide and 1 inch high? 2 inches high? 3 inches high?
5. How many cubic inches are there in a box 4 inches long, 2 inches wide and 2 inches high?
6. A block is 5 inches long, 2 inches wide and 3 inches high. How many cubic inches are there in it?

1. A pencil box containing 24 cubic inches is 3 inches wide and 1 inch high; how long is it?
2. A block is 3 feet long, 3 feet wide and 3 feet high; how many cubic feet does it contain? What is the area of one side of such a block in square feet? In square yards? How many cubic yards in a block 1 yard long, 1 yard wide and 1 yard high? How many cubic feet in such a block?
3. A room is 5 yards wide, 7 yards long and 4 yards high. How many cubic yards are there in the room?
4. A cellar is 7 yards long, 6 yards wide and 3 yards deep. How many cubic yards of earth were taken out in digging the cellar?
5. The foundation wall of one side of a building is 65 feet long, 4 feet high and $1\frac{1}{2}$ feet wide. How many cubic feet does it contain?
6. A box is 7 feet long, 3 feet wide and contains 63 cubic feet. How high is it?
7. A bin is 3 feet wide, 4 feet high and contains 72 cubic feet. How long is it?
8. A coal-bin is 12 feet long, 6 feet wide and 7 feet high. How many cubic feet of coal will it hold?
9. A car is 61 feet long, 10 feet wide, and $10\frac{1}{2}$ feet high. How many cubic yards does it contain?
10. A man has 4 bins, each 5 feet long, 4 feet wide and 3 feet high. How many cubic feet of coal will they hold together?
11. A bin is 12 feet long, 9 feet wide and 6 feet high. How many cubic yards does it contain?
12. 1 box is 4 feet long, 3 feet wide and 2 feet high. A second is 5 feet long, 3 feet wide and 2 feet high. A third is 6 feet long, 5 feet wide and 4 feet high. How many cubic feet in the 3 boxes?



1. Review pages 69 and 128.
2. How many edges do you see on this block? How many edges has this block?
3. Measure its edges. How long are they? Are all the edges of the block of equal length? What do you call such a block?
4. If you should place 12 of these cubes in a row, how long would the row be?
5. If you should place 12 of these rows side by side, how wide would the whole be?
6. How many cubes would you use?
7. What figure would the upper surface of the cubes form?
8. How many square inches would there be in this surface? How many inch cubes would you use in forming this layer?
9. If you should place another layer of cubes on those already used, how many cubic inches would you have? How many if you used 3 layers? 4 layers? 5 layers? 6 layers? 7 layers? 8? 9? 10? 11? 12?
10. Suppose the picture represents 12 layers of inch cubes, each layer containing 12 rows of 12 cubes each. What would the edges measure? What would you call such a cube? How many cubic inches would it contain?
11. If you should take one-half of this cube and divide into 4 equal cubes, what would each cube measure?
12. What part of the whole cube would each be?
13. How many cubic inches in each part?
14. How many cubic inches in three-eighths of a cubic foot? In seven-eighths? In one-fourth? In three-fourths?

1. A strawberry box is 6 inches long, 4 inches wide and 4 inches deep. How many such boxes can be packed in a case 2 feet long, 1 foot wide and $\frac{2}{3}$ of a foot high?
2. There are 231 cubic inches in 1 gallon. How many gallons can be put into a pail holding 693 cubic inches?
3. How many boxes 12 inches long, 6 inches wide and 3 inches high can be packed in a case 6 feet long, 4 feet wide and 4 feet high?
4. How many cubic feet of air will a glass jar 24 inches long, 18 inches wide and 12 inches high hold?
5. From a vessel holding 2 cubic feet of water 864 cubic inches were taken. How many cubic inches remain? How many cubic feet?
6. In 1 jar there are 864 cubic inches of liquid; in another 2592 cubic inches. How many cubic feet in a third jar, holding as much as the first and second together?
7. A man put 12 inches of sand into a box 9 feet long and 5 feet wide. How many cubic feet of sand in the box?
8. A wagon box 3 feet wide and 9 feet long is $1\frac{1}{3}$ feet deep. How many cubic feet will it hold?
9. A ditch 45 feet long and 2 feet wide contains 630 cubic feet. How deep is the ditch?
10. A freight car is 32 feet long and 6 feet wide inside and is filled with sand $3\frac{3}{4}$ feet deep. How many cubic feet of sand are in the car?
11. A wall is 44 feet long $5\frac{1}{2}$ feet high and 18 inches thick. How many cubic feet in the wall?
12. A sidewalk is 6 inches thick and 6 feet wide. How many cubic feet in 124 feet of the sidewalk?
13. In a building there are 18 pillars 2 feet by 18 inches and 14 feet high. How many cubic feet in these pillars?

Table of Cubic Measure.

1728	cu. in. (cubic inches)	= 1 cu. ft. (cubic foot).
27	cu. ft.	= 1 cu. yd. (cubic yard).
128	cu. ft.	= 1 cord.
231	cu. in.	= 1 gal.
2150½	cu. in. (nearly)	= 1 bu.

1. Add:

cu. yd.	cu. ft.	cu. in.
7	6	27
2	10	250
4	2	41
8	3	3
3	4	120

cu. yd.	cu. ft.	cu. in.
6	14	55
2	2	17
3	3	40
1	2	160
8	4	50

cu. yd.	cu. ft.	cu. in.
20	10	75
7	5	50
5	1	64
3	8	125
2	3	800

cu. yd.	cu. ft.	cu. in.
4	7	800
7	6	600
3	4	20
2	2	8
9	7	300

2. Subtract:

cu. yd.	cu. ft.	cu. in.
10	25	1200
6	16	900

cu. yd.	cu. ft.	cu. in.
9	18	350
5	9	275

cu. yd.	cu. ft.	cu. in.
14	20	800
7	13	246

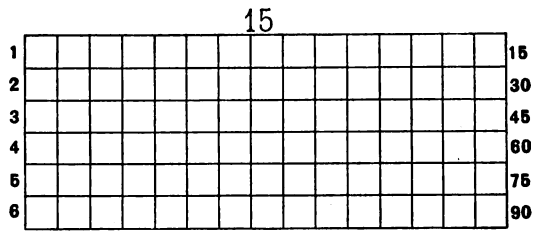
cu. yd.	cu. ft.	cu. in.
11	15	920
6	7	256

3. Multiply:

cu. yd.	cu. ft.	cu. in.
6	7	576
		3

cu. yd.	cu. ft	cu. in.
12	6	432
		4

1. A boy carried enough wood to make a pile 4 ft. long, 2 ft. wide and 2 ft. high. What part of a cord did he carry?
2. What must be the cubic contents of a jar to hold $\frac{2}{3}$ of a gallon? $2\frac{1}{3}$ gals.? $4\frac{4}{7}$ gals.?
3. How many cubic inches are there in a bin holding 2 bu.? $\frac{1}{2}$ bu.? $5\frac{1}{3}$ bu.? $4\frac{1}{8}$ bu.? $6\frac{1}{4}$ bu.?
4. A cord of wood is usually piled 8 ft. long and 4 ft. wide. How high is it?
5. A bin holds 16 bu. How many cubic inches does it contain?
6. A water trough contains 12 gals. of water. It is 14 in. wide and 9 in. deep. How long is it?
7. How many cu. yds. of earth will be excavated for a cellar that is 24 ft. long, 21 ft. wide and 12 ft. high?
8. From a cellar 36 ft. long and 18 ft. wide 6804 cu. ft. of earth was taken. How deep was the cellar?
9. How many cu. yds. of rock was blasted from a tunnel that is $9\frac{1}{2}$ ft. high, 80 ft. long and $12\frac{1}{2}$ ft. wide?
10. A cubic foot of water weighs 1000 ounces. What will water enough to fill a trough 6 ft. long, 2 ft. wide, and $1\frac{1}{2}$ ft. deep weigh in pounds?
11. If oil weighs $\frac{7}{8}$ as much as water, what is the weight of a cubic foot of oil in pounds?
12. A street sprinkler holds 168 cu. ft. of water. How much does it hold in pounds?
13. If such a street sprinkler is emptied every 24 minutes during 9 hours, how many buckets of water are used if a bucket holds $\frac{1}{3}$ of a cu. ft.?
14. A rectangular tank 6 ft. wide, 10 ft. long, and 3 ft. deep is full of water. What is the weight of the water?
15. 35 cu. ft. of coal will weigh about 2000 pounds. How many tons will a wagon box 7 ft. long, 3 ft. wide, and 2 ft. high weigh if loaded full?



1. Add:

15	15	15	15	15	30
15	30	45	60	30	30
15	15	15	15	45	30

2. $15 \times 2 =$ _____. $15 \times 3 =$ _____. $15)60$

   $15 \times 4 =$ _____. $15 \times 6 =$ _____.

   $15 \times 5 =$ _____. $15)45$ $15)90$

3. 15 is what part of 30? 60? 45? 90? 75?

   30 is how many 15's? What part of 45? 60? 75? 90?

   45 is how many 15's? How many 30's? What part of 60? Of 75? 90?

   60 is how many 15's? How many 30's? 45's? What part of 75? Of 90?

   75 is how many 15's? How many 30's? 45's? 60's? What part of 90?

   90 is how many 15's? How many 30's? 45's? 60's? 75's?

4. A boy bought 3 dozen oranges at the rate of 15¢ a dozen. What did they cost him?

5. A girl bought 12 handkerchiefs at the rate of 2 for 15¢. What did they cost her?

6. Railroad fare for a picnic excursion was 15¢ for the round trip. How much was collected on a train of 9 cars with 65 persons in each car?

1. At a school entertainment there were 186 grown people who paid 15¢ each and 324 children at 10¢ each. The expenses were $15.25. How much was left for the school?
2. A class of 25 pupils have a spelling lesson of 15 words. 15 of them write the lesson once, 6 of them write it twice, and 4 write it three times. How many words were written by each pupil? By all the pupils together?
3. The pupils of a school put $14.06 into the Penny Savings Bank on Monday and take out $2.40; they put in $7.24 on Wednesday and take out $1.56, and they put in $9.28 and take out $4.10 on Friday. How much more do they put in than they take out for the week?
4. A peddler buys 15 bu. of apples at 90¢ per bushel and sells them at 15¢ per half peck. How much does he make if he sells them all?
5. A banana peddler buys 100 dozen bananas for $7.50. He sells $\frac{1}{4}$ of them at 15¢ per dozen, $\frac{1}{2}$ of them at 10¢ per dozen, 20 dozen at 5¢ per dozen, and the rest spoiled. How much does he make?
6. A junk dealer buys 1000 pounds of old iron for $1.20 and 400 pounds of lead for $6. He sells the iron for $\frac{1}{2}$¢ per pound and the lead for $3\frac{1}{2}$¢ per pound. How much does he make?
7. A milk dealer sells every day 6 cans of milk each holding 8 gallons. How many customers has he if each one takes 2 qts.? If each takes 3 pts.?
8. If he pays 90¢ per can for the milk, and sells it for 5¢ per quart, how much does he gain?
9. A sugar plantation in Cuba produces 480 hhds. of sugar, averaging 540 lbs. in weight. What is the value of the sugar at $2\frac{1}{2}$¢ a pound? At 2¢ a pound, what is the value of the sugar from 15 such plantations?

TABLE OF LIQUID MEASURE.

4 gi. (gills) = 1 pt. (pint).
2 pt. = 1 qt. (quart).
4 qt. = 1 gal. (gallon).
31½ gal. = 1 bbl. (barrel).

1. Review pages 9 and 78 as oral work.

2. Add:

gal.	qt.	pt.
4	2	1
3	1	1

gal.	qt.	pt.
7	3	
2		2

bbl.	gal.	qt.
2	14	1
3	6	3

bbl.	gal.	qt.
1	20	1
	11	1

gal.	qt.	pt.
15		1
2	3	

hhd.	bbl.	gal.	qt.
1		16	1
	1	15	1

3. Subtract:

gal.	qt.	pt.
7	4	2
3	3	1

gal.	qt.	pt.
4	2	2
2	1	1

gal.	qt.	pt.
14	6	3
4	4	2

bbl.	gal.	qt.
3	30	2
1	21	

bbl.	gal.	qt.
4	15	3
2		1

bbl.	gal.	qt.
1	31	2
	8	1

4. Multiply:

gal.	qt.	pt.
2	3	1
		2

gal.	qt.	pt.
7	1	2
		4

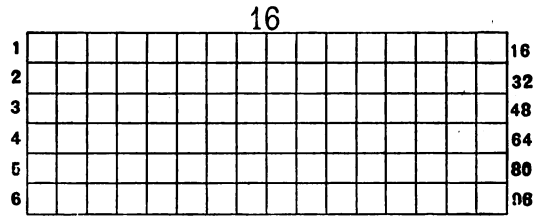
bbl.	gal.	qt.
2	10	2
		3

5. A milkman starts with 42 gal.; sells $\frac{2}{3}$ of the milk to private customers, the rest to a hotel. How many quarts does he sell to the hotel?

6. A druggist put 1 qt. of liquid into bottles holding $\frac{1}{2}$ gi. each. How many bottles did he use?

7. How many jelly glasses holding $\frac{2}{3}$ of a pt. each can be filled from 1 gal. of jelly?

1. How many pint bottles will hold 2 gals. 1 pt. of vinegar? What is it worth at 13¢ a quart?
2. If a gallon of wine cost $4, what will 5 pts. cost?
3. From a milk can holding 8 gals., $\frac{3}{16}$ of the milk was spilled. How many quarts were left? How many gallons?
4. How much ice cream will a man make if he uses a gallon and a half freezer and has it full twice, and half full the third time?
5. How many gals. in 412 gills?
6. What part of 12 gals. is $4\frac{1}{2}$ gals.?
7. A man sold 12 cans of mineral water, each holding 6 gals. at 15¢ per gal. How much did he receive?
8. How many oil barrels, each holding 45 gals., can be filled from a tank holding 10,800 gals. of oil?
9. A hotel uses 25 gals. 3 pts. of milk each day. How much does it use in 3 weeks?
10. There are 231 cu. in. in 1 gal. How many cubic inches in a bottle holding 2 qts.?
11. How many cubic inches in a cistern holding 10 bbls.? 12 bbls.? 16 bbls.?
12. In a jar that holds 2 gals., 3 qts. of water are placed. How many cubic inches of the jar are unfilled?
13. From a barrel of vinegar a grocer fills 2 four-gallon jugs and puts 3 gals. and 1 qt. in another jug. How many gals. had he left?
14. A man sells 3 gals. and 2 qts. of molasses to one customer; 2 gals. and 1 qt. to another customer, and 1 qt. and 1 pt. to a third. How many quarts did he sell in all? How many gallons?
15. From a barrel full of rain water, 80 qts. were taken out at different times. The water remaining in the barrel measured 40 qts., the rest having evaporated. How many quarts had evaporated?



1. Add:

16	16	16	16	16	48
16	32	16	32	32	48
		32	32	48	

2. $16 \times 3 =$ _____. $16 \times 5 =$ _____.
   $16 \times 2 =$ _____. $16 \times 6 =$ _____.
   $16 \times 4 =$ _____.
3. 16 is what part of 32? 48? 64? 80? 96?
4. 32 is how many 16's? What part of 48? Of 64? 80? 96?
5. 48 is how many 16's? How many 32's? What part of 64? Of 80? 96?
6. 64 is how many 16's? How many 32's? 48's? What part of 80? Of 96?
7. 80 is how many 16's? How many 32's? 48's? 64's? What part of 96?
8. 96 is how many 16's? How many 32's? 48's? 64's?
9. A farm of 96 acres was divided into 16 equal parts. How many acres in each?
10. In a square mile of land there are 16 farms equal in size. How many acres in each? If one of these farms is divided into 3 fields, two of which contain 16 acres each, what is the area of the third field?
11. From a bin containing 80 lbs. of meal, 2 eight-lb. packages were taken. How many sixteen-lb. packages can be made from the remainder?

1. A brick mason contracts to build a chimney for $72. If it takes 10 days to do the work and he pays each of his 2 helpers $1.50 per day, what is his rate of pay per day?
2. A man agreed to haul away 1560 cu. yds. of clay for $264. He paid 4 teamsters $3.90 each per day for 13 days. How much did he have left? What did each teamster receive?
3. If each teamster was paid at the rate of 13¢ per cu. yd., how many yds. did he haul to earn what he received?
4. A man hauls sand for 9¢ per cu. yd. If his wagon holds $1\frac{1}{2}$ cu. yds. and he hauls 18 loads per day, what is his daily pay?
5. A newsboy buys his papers at the rate of 10 for 6¢ and sells them for 1¢ each. How much will he gain if he sells 75 papers? 120 papers?
6. He sells 45 on Monday, 54 on Tuesday, 81 on Wednesday, and 70 on Thursday. What does he gain in the 4 days?
7. On Friday he buys 100 papers and sells all but 5 that are spoiled by the rain. What does he receive for his work on Friday?
8. A newspaper prints $1\frac{1}{2}$ million copies in 6 days. At the end of the week 13,526 copies had been given away and 29,674 copies were left on hand. What was the average daily circulation?
9. If $\frac{1}{2}$ of these papers are sold by newsboys, how many newsboys must there be, if each one sells 100 papers every day?
10. A man divides 80 acres of land into streets and building lots. The streets take up $\frac{1}{16}$ of the land, and the remainder is divided into blocks each containing 3 A. How many blocks?

2 pt = 1 qt. 4 pk. = 1 bu.
8 qt. = 1 pk. (peck)

1. Review pages 11 and 67 as oral work.
2. Add:

3 bu., 1 pk., 6 qt.	1 bu., 2 pk., 3 qt.	2 bu., 3 pk., 4 qt.
1 bu., 2 pk., 1 qt.	2 bu., 1 pk., 5 qt.	3 bu., 4 qt.
4 bu., 2 pk., 5 qt.	5 bu., 2 qt.	3 bu., 3 pk., 7 qt.
1 bu., 2 pk.,	3 pk., 6 qt.	1 qt.

3. Subtract:

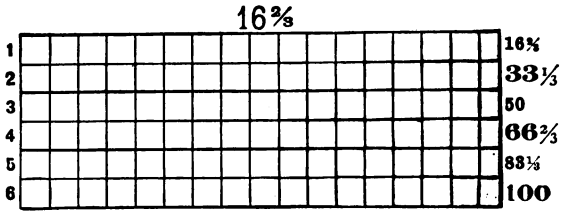
5 bu., 3 pk., 6 qt.	3 bu., 2 pk., 7 qt.	6 bu., 1 pk., 5 qt.
1 bu., 2 pk., 4 qt.	2 bu., 5 qt.	1 bu., 1 pk., 1 qt.
4 bu., 2 pk., 4 qt.	8 bu., 3 pk., 5 qt.	12 bu., 2 pk., 6 qt.
1 pk., 4 qt.	2 bu., 2 pk., 2 qt.	7 bu., 4 qt.

4. Multiply.

2 bu., 2 pk., 3 qt.	3 bu., 1 pk., 3 qt.	4 bu., 1 pk., 1 qt.
2	3	4

5. How many bushels in 128 pks.? In 150 pks.?
6. How many quart boxes will 1 bu. 3 pks. 2 qts. fill?
7. Find cost of 3 pks., 6 qts., 1 pt. of nuts, at $12\frac{1}{2}¢$ a pint?
8. In 96 qts. how many pecks? How many bushels?
9. What part of 7 bu. are 7 pks.? 7 qts.?
10. How many quarts of cherries can be bought for $2, if 1 bushel of cherries is worth $3.20?
11. I bought 7 bu. 3 pks. of potatoes on Monday; 8 bu. on Tuesday and 10 bu. 1 pk. 6 qts. on Wednesday. How many potatoes did I buy in all?
12. A teamster feeds his horses 36 qts. of oats a day. How long will 120 bu. of oats last him? What does it cost him each day when oats are worth 27¢ a bu.?

1. From a sack of peanuts holding 3 bu., 25 qts. were taken. How many bushels remained?
2. A bushel of plums is divided equally among 12 people. How many quarts did each receive?
3. How many pecks of beans will a man sell who sells 3 qts. to each of 8 customers?
4. A woman measuring out $2\frac{1}{2}$ qts. of flour uses a measure holding $\frac{1}{2}$ pt. How many times does she fill the measure?
5. A barrel of apples was sold in 3 lots. The first sale was 1 bu. and 2 pks.; the second 2 pecks; the third $1\frac{1}{2}$ bu. How many bushels were there in the barrel?
6. From 3 bushels of peas, a man sells $\frac{1}{2}$ peck to one customer; 4 qts. to another, 1 pk to another. How many has he left?
7. If one-half a peck of peaches when canned make 3 qts., how many bushels must be bought to make 36 qts. of canned peaches?
8. A man bought at a feed store 5 bu. of corn, 2 bu. and 3 pks. of oats and $1\frac{1}{2}$ bu. of mixed feed. He had at home in the bins, 3 pks. of corn, $\frac{1}{2}$ bu. of oats and 1 pk. of ground feed. How many bushels of feed did he have in the bins after he received what he bought?
9. In one year a farmer's family used $50\frac{1}{4}$ bu. of potatoes. He saved 9 bu. 3 pks. for planting and sold 117 bu. and $3\frac{1}{2}$ pks. How many bushels did he raise that year?
10. 240 boxes of peaches, holding 1 pk. each, were shipped to market. The fruit was picked in one-half bu. baskets. How many baskets of fruit were there?
11. A fruit dealer bought 2 crates of strawberries, each holding 24 qts.; and 6 crates, each holding 32 qts. The berries were put into pint boxes and sold for 10¢ a box. What did the dealer receive for the berries?



1. Add:

$16\frac{2}{3}$	$16\frac{2}{3}$	$16\frac{2}{3}$	$33\frac{1}{3}$	$66\frac{2}{3}$	$83\frac{1}{3}$
$16\frac{2}{3}$	$33\frac{1}{3}$	50	$33\frac{1}{3}$	$16\frac{2}{3}$	$16\frac{2}{3}$

2. $16\frac{2}{3} \times 3 =$ _____. $16\frac{2}{3} \times 6 =$ _____.
   $16\frac{2}{3} \times 2 =$ _____. $16\frac{2}{3} \times 6 =$ _____.
   $16\frac{2}{3} \times 4 =$ _____.
3. $16\frac{2}{3}$ is what part of 50? $66\frac{2}{3}$? $33\frac{1}{3}$? $83\frac{1}{3}$?
4. $33\frac{1}{3}$ is what part of 50? $66\frac{2}{3}$? $83\frac{1}{3}$? 100?
5. 50 is how many $16\frac{2}{3}$'s? $33\frac{1}{3}$'s? What part of $66\frac{2}{3}$? $83\frac{1}{3}$? 100?
6. $66\frac{2}{3}$ are how many $16\frac{2}{3}$'s? $33\frac{1}{3}$'s? 50's?
7. $83\frac{1}{3}$ are how many $16\frac{2}{3}$'s? $33\frac{1}{3}$'s? 50's? $66\frac{2}{3}$'s?
8. 100 is how many $16\frac{2}{3}$'s? $33\frac{1}{3}$'s? 50's? $66\frac{2}{3}$'s? $83\frac{1}{3}$'s?
9. A man paid $\frac{1}{6}$ of a dollar each for 15 books. What did they cost him?
10. A boy $33\frac{1}{3}$ miles from home, rode $\frac{1}{2}$ the distance on his wheel. How many miles did he ride?
11. A piece of cloth 3 yds. long sold for 50¢. What was the price per yd.?
12. A girl picked $66\frac{2}{3}$ qts. of berries in 4 days. What was the average amount per day?
13. A hundredweight of grain was divided into 6 equal amounts. How many pounds in each?
14. From a tank of water, $16\frac{2}{3}$ gals. were drawn out, which were $\frac{1}{6}$ of the amount remaining. How many gallons were left in the tank?

1. A schooner brought 48,972 spruce trees from northern Michigan to Chicago at Christmas time. What are they worth at 90¢ a dozen?
2. A blacksmith shoes 42 horses at $2 each in 1 week. The shoes and nails cost him $8, shop rent $12, and he pays each of his two helpers $15 per week. What was his share of the money received?
3. A teamster has his two horses shod all around, twice each month, during December, January and February, and once a month the remainder of the year. What does it cost a year at $2 per shoeing for each horse?
4. A cooper made 1000 butter tubs at 12¢ each and 600 barrels at 30¢ each. If he paid $\frac{1}{6}$ of the price for lumber and $\frac{1}{2}$ of it to his workmen, how much did he have left?
5. If each tub holds 24 pounds, what will 1000 tubs of butter be worth at 21¢ per pound?
6. If each bbl. holds 3 bu. of apples, what will 600 bbls. bring if sold at 30¢ per peck?
7. There are 630 sq. yds. of lathing needed in a new house and it can be done in 6 days. Will a man earn more by doing it by the day at $3 per day or by the square yard at 3¢ per sq. yd.?
8. If 54 laths will cover 4 sq. yds. how many will be needed for 600 sq. yds.? How many bundles of 50 laths each?
9. If each lath uses 6 nails, and 54 laths cover 4 sq. yds., how many nails will 600 sq. yds. use? How many pounds allowing 400 nails to the pound?
10. A carpenter works $5\frac{1}{2}$ days in a week at $3 per day, but breaks a saw worth $1.40 and loses a hammer worth 90¢. What is the week's work worth to him?
11. A painter has 3 helpers at $3.50 per day and 2 at $3. What must he charge for a week's work so as to have $25 for himself?

1. Review pages 162 and 163.
2. What is the name of the first period?
3. What is the name of the second period?
4. How many places are there in units' period?
5. Each period has three places.

Thousands.			Units.		
Hundreds.	Tens.	Ones.	Hundreds.	Tens.	Ones.
2	4	6 ,	1	2	3

6. Read the figures of each period as though they stood alone and then add the name of the period.

246 thousands.
123 units, or ones.

7. If we multiply the number 246,123 by 10 we will have the beginning of a new period, 2,461,230.
8. This will be read:

2 millions (this is the name of the new period).
461 thousands
230

9. The use of figures to represent numbers, as we have been doing, is called the Arabic Notation or method of writing numbers.
10. There is another method of writing numbers, in which letters are used. This is the Roman Notation.
11. Fill out the following blanks with figures:

I = _____.	VI = _____.	XI = _____.
II = _____.	VII = _____.	L = _____.
III = _____.	VIII = _____.	C = _____.
IV = _____.	IX = _____.	XL = _____.
V = _____.	X = _____.	XC = _____.

12. What is the equivalent in figures of I? V? X? L? C? D? M?

1. If a letter is followed by one or more letters of equal or less value, the sum of all is the value of the number represented. Thus: VI = 6; XI = 11; XX = 20; CLX = 160; DC = 600.
2. If a letter is followed by another of greater value, the difference of the two is the value of the number represented. Thus: IV = 4; IX = 9; XIX = 19; XL = 40; CD = 400.
3. Read the following numbers written in the Roman Notation:

IV	VIII	II	IX
XIX	XVI	XIV	XXXIX
XXXIV	XLIV	XXVII	XI
XLIX	LIV	LXIX	LXXVIII
XCIX	CIX	CLXIX	LC
CCCXXVI	MCLXXIV	DIX	MLV

4. Write the following numbers in the Roman Notation:

9 = _____.	13 = _____.	96 = _____.
4 = _____.	78 = _____.	104 = _____.
7 = _____.	44 = _____.	199 = _____.
6 = _____.	83 = _____.	335 = _____.
14 = _____.	59 = _____.	549 = _____.
29 = _____.	94 = _____.	2000 = _____.

(Write answers to the following in Roman numerals.)

5. Columbus discovered America in MCDXCII; 20 years later Florida was explored. In what year was Florida explored?
6. The first battle of the Revolution was fought in MDCCLXXV; the last battle was fought 6 years later. What was the year of the last battle?
7. Washington was elected President in MDCCLXXXIX; Lincoln was elected 71 years afterward. In what year was Lincoln elected?

1. Review page 129.
2. A farmer sold five tons of hay. The first load weighed 2,112 pounds, the second 1,936 pounds, the third 1,987 pounds, and the fourth 2,174 pounds. What did the first load weigh?
3. Add:

(a)	(b)	(c)	(d)	(e)	(f)
7843	32765	25987	96875	81818	247
8789	89247	6586	40984	92193	91838
9576	76348	78379	50839	87689	9705
2589	20873	96468	9787	76434	87278
8956	94608	980	67898	68979	3849
3210	13495	20876	76580	37590	89878
7029	68950	67099	54777	89763	79929
47992					
334					

In long columns the number to be carried may be indicated by placing the figure immediately underneath the column as in problem (*a*).

To prove your work, add the columns from the top, downward

4. Add the following problems in the usual way:

(a)	(b)	(c)	(d)
68	238	237	24567
97	472	48984	89012
89	836	3789	4567
43—297	980——?	54976——?	89876——?
30	722	500	54378
78	146	3897	98989
83	348	57878	24864
29—220	765——?	36498——?	3099——?
48	897	9889	87655
67	305	65847	98788
98	969	678	4890
88—301	878——?	88769——?	86767——?
818 818			

Another method of proof is to think the columns divided into shorter columns, add the parts, as indicated in problem (*a*), and add these separate sums.

1. 6384 The *Minuend* is the number subtracted from.
   1945 The *Subtrahend* is the number subtracted.
   4439 The *Difference* or *Remainder* is the result.
   6384 The sum of the difference and subtrahend should be the minuend. If so the work is correct.

2. Subtract the following and prove your work:

(1)	(2)	(3)	(4)	(5)	(6)
8346	24890	36745	48234	57855	72180
5838	17901	17829	29018	29666	23092
(7)	(8)	(9)	(10)	(11)	(12)
62387	83475	90281	38297	27666	87726
34299	56077	37345	19088	18785	68640
(13)	(14)	(15)	(16)	(17)	(18)
418967	687240	723485	868240	927200	707241
229875	478119	438907	372906	418117	354438
(19)	(20)	(21)	(22)	(23)	(24)
381487	592173	600840	821380	727248	917288
191598	394205	236450	291653	570649	129399

3. A man began business with $5,275.75; in five years he had $22,794.50. How much had he gained?
4. One country road is 20 mi. 160 rds. long; another is 14 mi. 80 rds. long; how much longer is the first?
5. A cotton dealer bought 328,900 lbs. of cotton one year, and 715,600 lbs. the next. How many more lbs. did he buy the second year?
6. One vessel is valued at $1,250,000; another at $975,800. What is the difference in value?
7. A box containing 43,200 cu. in. was divided into two parts; one holding 25,920 cu. in. How many cu. in. in the second part?

1. Review pages 37 and 142.

2. Multiply 892 by 235. Which number is the multiplicand? The multiplier? The product?

To how many times 892 is the sum of 5 times 892 + 30 times 892 + 200 times 892 equal?

Multiply 892 by 235

4460	=	5 × 892
26760	=	30 × 892
178400	=	200 × 892
209620	=	235 × 892

CONVENIENT FORM.

892
235
4460
2676
1784
209620

NOTE: It will be noticed that the first figure of the products from multiplying by the separate numbers of the multiplier is placed directly under that figure of the multiplier. The remaining figures of the products are written as usual to the left. See the multiplication of 892 by 235, second form.

3. Multiply the following:

(1)	(2)	(3)	(4)	(5)	(6)	(7)
563	589	789	582	678	765	899
365	589	579	376	497	689	655

4. Multiply (*a*) 729 by 460; (*b*) 476 by 308.

(*a*)	(*b*)
729	476
460	308
43740	3808
2916	1428

5. Compare 4 × 5 with 5 × 4. Does 892 × 235 differ from 235 × 892? In multiplication why do we always use the smaller number for the multiplier? Give a way of proving that a product is correct.

1. Find the following products and prove results:

573 × 248	384 × 537	735 × 376	487 × 789
858 × 305	275 × 937	972 × 219	976 × 253
835 × 583	508 × 607	506 × 429	4005 × 129
968 × 675	651 × 234	309 × 150	2060 × 456
809 × 584	943 × 923	847 × 907	3070 × 250
548 × 394	475 × 406	653 × 295	1022 × 284

2. An elevator in a tall building goes up 165 ft. and down the same distance each trip. How many feet does it go in 152 trips?
3. If it cost 56¢ per word for a cablegram from Japan to Chicago, what is the cost of a message of 1213 words?
4. If a steamer burns 378 pounds of coal in going 1 knot, how many pounds will she burn in going 15,288 knots?
5. There are 40 street lamps on 1 mile of street, each burning 18 cu. ft. of gas every night. How much gas will they burn in the month of April?
6. A library has in one case 276 books, which contain, on an average, 304 pages each. How many pages of reading matter in the bookcase?
7. There are 897 hills of corn in a single row and 364 such rows in a field. How many hills of corn in the entire field?
8. How many square feet in an acre? If 189 pounds of water fall on one square foot in a year, how many pounds will fall on an acre?
9. There are 12 elevators in a building. They each make 94 round trips in a day and carry, on an average, 4 passengers each way. How many passengers make single trips on all of them in a day?
10. In a single layer in a wall there are 964 bricks. The wall is 197 bricks high. How many bricks does it contain?

1. Divide 21,816 by 72.

$$\begin{array}{r} 303 \\ 72\overline{)21816} \\ 216 \\ \hline 216 \\ 216 \\ \hline \end{array}$$

$21{,}816 \div 72 = 303$; what will $303 \times 72 =$ How, then, may we prove the correctness of our work in division?

2. Divide 15,250 by 61.

$$\begin{array}{r} 250 \\ 61\overline{)15250} \\ 122 \\ \hline 305 \\ 305 \\ \hline 0 \end{array}$$

3. Divide 5130 by 342.

$$\begin{array}{r} 15 \\ 342\overline{)5130} \\ 342 \\ \hline 1710 \\ 1710 \\ \hline \end{array}$$

4. Divide 25,215 by 105.

$$\begin{array}{r} 240\frac{15}{105} \\ 105\overline{)25215} \\ 210 \\ \hline 421 \\ 420 \\ \hline 15 \text{ rem.} \end{array}$$

Proof:

$$\begin{array}{r} 105 \text{ divisor.} \\ 240 \text{ quotient.} \\ \hline 4200 \\ 210 \\ \hline 25200 \\ 15 \text{ rem.} \\ \hline 25{,}215 \text{ dividend.} \end{array}$$

To prove the correctness of division, multiply the divisor by the quotient, and add the remainder if there be one. The result should equal the dividend.

5. Divide:

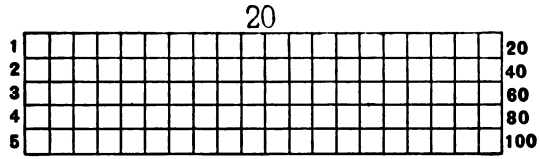
$3767 \div 38$	$99{,}684 \div 234$
$7873 \div 41$	$91{,}464 \div 111$
$7692 \div 32$	$94{,}770 \div 135$
$67{,}654 \div 53$	$95{,}928 \div 806$
$26{,}754 \div 64$	$90{,}750 \div 125$
$95{,}637 \div 75$	$68{,}331 \div 911$
$76{,}894 \div 86$	$33{,}633 \div 111$

1. There were 23 cars in a trainload of cattle and 21 head of cattle in each car. The entire weight of the cattle was 645,502. What was the average weight per head?
2. An apartment building containing 48 apartments cost $132,240. What was the average cost of each apartment?
3. A farmer paid $20,000 for 324 acres of land. How much did it cost him per acre?
4. Solve the following:

516)220332	718)92622	356)182984	729)91125
618)400276	317)687020	540)72689	720)840671
427)600000	825)872640	207)907060	421)117000
5027)702060	1702)347020	1202)987261	4800)960000
5200)987654	3702)587869	1234)765432	1067)987000

5. On a certain trip the traveling expenses for one person to London and return were $325. How many such trips would $9100 furnish?
6. What was the average cost per mile of a railroad 750 miles long which cost $33,750,000?
7. A proofreader counted the number of words in a book, finding 88440 words on 268 pages. How many words were there on each page?
8. A wealthy man gave to the 4 fire departments of a village (each department employing 27 men) $32,400 as a donation for the firemen. How much did each man receive?
9. A lady donated $1701 to buy books for the school children of a certain town. There were 567 school children in the town. How much did each receive?

1. A lumber vessel carried 887,392 barrel staves. Allowing 16 staves to the barrel, how many barrels can be made from them?
2. A ship traveled about 15,228 nautical miles in 66 days, stopping 12 days on the way for coal and other supplies. What was her average speed per hour?
3. The Danube River is 1,725 miles long, the Rhine 600 miles and the Rhone 580 miles. How many times as long as the Thames, 220 miles, is their united length?
4. There are 102 counties in Illinois and the area of the state is 56,650 square miles. What is the average size of each county?
5. Chicago's area is 119,689 acres. How many square miles of land in Chicago?
6. A field of corn has in it 229,599 hills. There are 291 equal rows. How many hills in each row?
7. A rectangular farm contains 552,866 square yards. One end of it is 563 yards long. How long is one side?
8. A field contains 926,156 square feet. One end of it is 679 feet long. How long is one side?
9. At a brick yard 3,276,224 bricks were made during the season. They were hauled away in 824 equal loads. How many bricks were hauled at a load?
10. $48,077.29 was divided equally among 709 men. How much did each receive?
11. A merchant sold 999 bicycles for $41,793.72. What was the average selling price of each bicycle?
12. In 312 days of the year a merchant sold $91,040 worth of goods. What did his daily sales average?
13. In four years a factory uses 1,434,160 pounds of coal. What was the average amount used per week?
14. The Atlantic Ocean in the deepest part is 27,366 feet deep. What is its depth in miles?



1. How many 20's in 40? In 80? 60? 100?
2. 40 is how many 20's? What part of 60? Of 80? 100?
3. 60 is how many 20's? 40's? What part of 80? 100?
4. 80 is how many 20's? 40's? 60's? What part of 100?
5. 100 is how many 20's? 40's? 60's? 80's?
6. A boy bought 80 papers for 44¢. The next day he bought 20 papers at the same rate. What did they cost him?
7. A train goes 40 miles in 55 minutes. At the same rate how long will it take to go 80 miles?
8. A boy rode 9 miles in 1 hour. How far will he ride at the same rate in 40 minutes?
9. 60 qts. of syrup cost $7.20. At the same rate what will 5 gal. cost?
10. A man puts 20 pounds of meal in one sack. How many sacks will he need for 1 hundredweight?
11. $\frac{1}{3}$ of a bu. of wheat weighs 20 pounds. How many bu. weigh 60 pounds? 80 pounds? 100 pounds?
12. A toy bank holds $2 in dimes. How many weeks will it take to fill it if 20¢ are put in each week?
13. Allowing 4 weeks to the month, how many terms of 20 weeks are there in 10 months of school? How many terms does a boy spend in school who attends 25 school months?
14. It takes a man 20 minutes to reach his office. What part of an hour does it take him each day to go and return? How many hours does it take him in 6 days?
15. A man bought 40 horses for $2880. At the same rate what will be the cost of 100 horses?

16 oz. (ounce) = 1 lb.
100 lb. = 1 cwt. (hundredweight).
20 cwt. or 2000 lb. = 1 T. (ton).

1. How many ounces in 8 lbs.? In 14 lbs.? In 20 lbs.? In 25 lbs.?
2. How many pounds in $3\frac{1}{2}$ cwt.? In $7\frac{1}{5}$ cwt.? In $9\frac{1}{4}$ cwt.?
3. How many pounds in 1 T.? In 4 T.? In $3\frac{1}{4}$ T.?
4. How many ounces in $\frac{1}{2}$ cwt.? In $2\frac{1}{4}$ cwt.? In $3\frac{2}{5}$ cwt.?
5. How many ounces in $\frac{1}{2}$ T.? In $3\frac{1}{5}$ T.? In $2\frac{1}{8}$ T.?
6. How many hundredweights in $\frac{1}{2}$ T. and in $\frac{1}{4}$ T. together?
7. 1 T. equals 10 cwt. and how many pounds?
8. Add:

2 T.	17 cwt.	25 lb.
1	2	75

1 T.	8 cwt.	60 lb.
4	1	40

10 cwt.	25 lb.	8 oz.
5	30	6
4	44	2

9 cwt.	20 lb.	4 oz.
4	9	9
6	18	2

9. Subtract:

3 T.	15 cwt.	14 lb.
2	7	8

2 T.	12 cwt.	9 lb.
1	8	6

15 cwt.	75 lb.	8 oz.
8	35	5

16 cwt.	43 lb	12 oz.
14	23	8

10. Multiply:

3 T.	5 cwt.	15 lb.
		4

2 T.	3 cwt.	20 lb.
		5

2 cwt.	9 lb.	2 oz.
		8

4 cwt.	3 lb.	4 oz.
		4

11. Divide:

2)4 T. 18 cwt. 50 lb.

3)6 T. 15 cwt. 48 lb.

1. At 10¢ an oz. how much will $3\frac{1}{2}$ lbs. of cinnamon cost? $4\frac{1}{4}$ lbs?
2. What will a ton of hay cost at $\frac{1}{2}$¢ a pound?
3. A bushel of wheat weighs 60 lbs. How many bushels in a load of wheat weighing 1 T., 6 cwt. and 40 lbs.?
4. A family uses 75 lbs. of ice every day for 20 days. What does it cost them at 35¢ per cwt.?
5. From 10 cwt. of sugar a grocer sold 8 cwt., 40 lbs., 12 oz. How much was left?
6. 60 lbs., 10 oz. of tea were divided equally among 5 persons. How much did each receive?
7. A man bought 3 lbs., 8 oz. of meat at 16¢ a lb. and 2 lbs., 12 oz. of butter at 20¢ a lb. What was the total cost?
8. A bushel of oats weighs 32 lbs. How many bushels in 80 cwt.?
9. From a keg of nails weighing 1 cwt., 15 lbs. and 8 oz. were taken at one time, 9 lbs. and 12 oz. at another. What was the weight of the remainder?
10. How many bales of cotton, each weighing 450 lbs. may be shipped on a vessel which can carry 2250 tons? On a vessel that can carry 3000 tons?
11. What will it cost to have 8 tons of coal hauled at 75¢ a load of 3500 lbs.?
12. 500 bbls. of flour are shipped in 7 equal loads. How many tons will each load weigh if 1 bbl. weighs 196 lbs.?
13. A man hauled 8 loads of wheat, 35 bu. at a load. A bushel of wheat weighs 60 lbs. What was the weight of the 8 loads? How many hundredweight in each load?
14. A farmer owning 700 bu. of oats sold 9 loads of 2240 lbs. each. One bushel weighs 32 lbs. How many bushels had he left?

60 sec. (second) = 1 min
60 min. (minute) = 1 hr.
24 hr. (hour) = 1 d.
7 d. (day) = 1 wk. (week).

365 d.
52 wk. 1 d.
12 mo.
} 1 yr. (year).

1. Review page 109 as oral work.

2. How many months in $\frac{1}{2}$ a yr.? In $3\frac{1}{4}$ yrs.? In $5\frac{1}{6}$ yrs.?

3. How many minutes in 3 hrs.? In $2\frac{1}{3}$ hrs.? In $1\frac{1}{4}$ hrs.? In $\frac{3}{4}$ of an hr.? In one day?

4. In 4 yrs. how many days? In $2\frac{1}{5}$ yrs.? In $\frac{4}{5}$ of a yr.?

5. How many seconds in 5 min.? In one hr.? In $\frac{1}{2}$ an hr.? In $\frac{1}{2}$ a day?

6. Add:

8 hr., 30 min., 15 sec.	3 mo., 4 wk., 7 d.
3 29 45	8 3 12
1 yr., 8 mo., 15 d.	**2 yr., 6 mo., 10 d.**
3 2 5	2 4 15

7. Subtract:

24 hr., 50 min., 30 sec.	4 yr., 8 mo., 15 d.
8 30 15	1 2 6
6 yr., 4 mo., 20 d.	**5 yr., 9 mo., 6 d.**
3 3 12	4 8 5

8. Multiply:

4 hr., 15 min., 30 sec.	3 hr., 15 min., 20 sec.
2	3
4 yr., 2 mo., 4 d.	**5 yr., 2 mo., 3 d.**
5	6

1. Divide:

2)6 hr., 45 min., 15 sec.

6)24 hr., 30 min., 18 sec.

2)4 yr., 8 mo., 12 d.

5)5 yr., 10 mo., 15 d.

2. Find the time between June 6, 1885, to Aug. 12, 1889.

The difference between dates is found by subtraction, using the numbers of the months named.

	yr.	mo.	d.
Aug. 12, 1889 =	1889	8	12
June 6, 1885 =	1885	6	6
	4	2	6

3. Find the time from:

Jan. 2, 1865, to June 5, 1887.
Mar. 12, 1885, to May 21, 1889.
July 21, 1872, to Sept. 26, 1890.
Feb. 15, 1860, to Oct. 29, 1878.
Nov. 2, 1889, to Dec. 28, 1892.
Apr. 10, 1879, to Aug. 25, 1897.

4. If a boy works $\frac{1}{3}$ of each day for 6 days at 20¢ an hr., what is his week's salary? If he works 9 hrs. overtime, half of that time at 15¢ a half hour and the rest at 20¢ a half hour, what is his pay for the extra work?

5. A man leaves his office for home at 5.45 p. m., and arrives 45 min. later. What time does he reach home? If he takes the same time going and returning every day, how many hours does he thus spend in ten days?

6. A fast mail train runs from Chicago to Burlington in 5 hrs. 20 min. 45 sec. and a freight train runs the same distance in 9 hrs. 40 min. How much longer does it take the freight train?

7. James was born September 18, 1887, and Willie was born December 21, 1892. How much older is James?

1. There are 319 pages in a book, how many pages are there in 369 such books?
2. There are 18 windows on each side of a car. How many windows are there in 397 cars?
3. In a 7 story building, there are on each of the sides, 27 windows on each story; there are on each of the ends 16 windows on each story. How many windows in all?
4. A street paved with stone blocks contains 65 stones in width and 786 in length. One man must buy half of these. If they cost him 7¢ each, how much must he pay for them?
5. How many grains will 1,648 silver dollars weigh, if one dollar weighs 412½ grains?
6. A man deposits $372 in the bank each week day for 26 weeks. How much does he deposit in that time?
7. A man rides 116 miles a day on his bicycle. How far from the city can he go and return in 12 days?
8. It is 195 feet between the telegraph poles. How much wire is needed to put up 6 wires on 257 poles?
9. A merchant bought 97 rolls of carpet, 27 of them containing 56 yards to the roll, 34 containing 59 yards to the roll, and the remainder 63 yards to the roll. How many yards did he buy?
10. A manufacturer sold 65 cases of shoes, each case containing 6 dozen pairs, at $2.75 a pair. What was the amount of his sale?
11. A farmer had 2,365 bushels of wheat. He sold 1,240 bushels at 65¢ a bushel, 643 bushels at 85¢ a bushel, and the remainder at 96¢ a bushel. How much did he get for the entire crop of wheat?
12. A merchant's sales were $127 each day for 23 days, $156 each day for 19 days, and $113 each day for 32 days. How much were his sales for the entire time?

1. It is 85 miles from Chicago to Milwaukee. A man went from Chicago to Milwaukee and returned each day for 26 days. How many miles did he travel?
2. A man lived 27 miles from Chicago. He came into the city and returned 6 days each week for 14 weeks. How many miles did he travel?
3. A manufacturer sold 687 bicycles at $47 each. How much did he get for them?
4. An agent sold 163 reapers at $145 each. What was the amount of his sale?
5. The cost of one car is $965. A railroad company buys 235 such cars. What is the cost of the cars?
6. A square building is 115 feet high and 122 feet wide. What is the area of one of its sides in square feet?
7. The same building is covered with a flat roof. How many square feet in the roof?
8. 53 cars stand in a solid blockade on the street. 26 of them are 32 feet long and the remainder 37 feet long. How far is it from one end of the blockade to the other?
9. A street car company sold 540 horses at $62.25 each. How much did it get for the horses?
10. A man works $8\frac{1}{2}$ hours a day, 6 days in the week, for 26 weeks. How many minutes does he work?
11. For every 25 papers a boy delivered he received 13¢. If he delivered at this rate 175 papers a day each week day for 2 weeks, how much money did he get?
12. The school year contained 40 weeks. Each week I burned a quart of oil, which cost me 13¢ a gallon. What did my oil cost me for the school year?
13. An elevator boy received $13 a month as wages. At the end of the year he had spent $19 for clothing, $32 for car fare, $4.50 for books and had given his mother $48. How much money did he have left?

1. Review page 92.
2. A man had in his pocket one five-dollar bill, two two-dollar bills, three one-dollar bills, two half dollars, three quarters, four dimes, six nickels and three pennies. How can he make even change for any one of the following purchases:
3. A hat at \$2.65 and a necktie at 50¢?
4. A vest at \$3.50 and a dozen collars at 95¢?
5. One book at \$1.25 and another at 38¢?
6. A box of paper at 50¢, an inkstand at 65¢ and a fountain pen at \$1.95?
7. A pair of shoes at \$2.95?
8. Railroad fare at \$4.42?
9. Hotel bill for $2\frac{1}{2}$ days at \$2.50 a day?
10. A magazine, 35¢; a newspaper, 2¢, and a sheet of paper, envelope and stamp, 5¢?
11. A bicycle suit at \$6.70?
12. Repairing bicycle, \$4.70?
13. A boy went to the bank to get change, at various times, for the following amounts. How many of each piece of money might be given him?
14. A twenty-dollar bill so as to get five-dollar bills, one-dollar bills and half dollars?
15. A ten-dollar bill, so as to get two-dollar bills, one-dollar bills, half dollars and quarters?
16. A five-dollar bill, so as to get dollars, half dollars, quarters and dimes?
17. A two-dollar bill, so as to get half dollars and dimes?
18. A one-dollar bill, so as to get quarters, dimes, nickels and pennies?
19. A half dollar, so as to get dimes, nickels and pennies?
20. A quarter, so as to get pennies, nickels and any other coin that he could get?

24 sheets = one quire. 20 quires = one ream.

1. How many sheets in $\frac{1}{2}$ a quire? In $\frac{3}{4}$ of a quire?
2. How many sheets in $\frac{1}{3}$ of a ream? In 2 reams?
3. How many quires in 72 sheets? In 96 sheets? In 240 sheets?
4. What is the cost of a quire of paper at 2¢ a sheet?
5. What is the cost of a ream of paper when bought at 3 sheets for 1¢?
6. A man bought 1 box of paper containing 2 quires and another containing 5 quires. How many sheets of paper did he get?
7. If 12 sheets of paper cost 5¢, what is the cost of a ream at the same rate?
8. I paid $1.20 for a ream of paper. What was the cost of $\frac{1}{2}$ a quire?
9. How many boxes will hold a ream of paper if each box contains $1\frac{1}{3}$ quires? $1\frac{1}{4}$ quires?
10. A man bought paper at $1.50 a ream and sold it at 12 sheets for 5¢. How much did he gain?
11. A man bought paper at $2.75 a ream and sold it at 20¢ a quire. What was his gain? If he had paid $3 a ream and sold it at 25¢ a quire, how much more would he have gained?
12. A ream of paper is divided into 40 equal parts. What part of a quire is each?
13. From 3 reams of paper $1\frac{1}{4}$ reams were sold at one time and 3 quires at another time. How many sheets remained? How many quires? What part of a ream?
14. After collecting damaged lots of paper, a man found he had 18 quires and 10 sheets of one kind, 11 quires and 5 sheets of another kind, and 10 quires and 5 sheets of a third kind. He sold it at $1.25 a ream. What did he get for all?

1. A man leaves his home each week day at 8.11 in the morning and reaches his office at 8.27. He returns in the evening, leaving his office at 5.45 and reaching his home at 6.01. How many hours does he spend on the way in a week? In the month of January, if there are 4 Sundays in a month?
2. A teacher leaves her home each morning at 8.20 and reaches the school-house at 8.47. She returns, leaving the school-house in the evening at 3.43 and reaching her home at 4.05. How many hours does she spend on the way in 4 weeks? How many hours in the school year if there are 38 weeks of school in a year?
3. How far does she travel in 4 weeks if the school-house is $\frac{7}{8}$ of a mile from her home? How far does she travel in a school year of 40 weeks?
4. A train leaves St. Louis at 11.31 in the evening and reaches Chicago at 8 o'clock in the morning. It stops 11 minutes at stations on the way. What is the actual running time from St. Louis to Chicago?
5. A train leaves Chicago at 9 o'clock in the evening and arrives in St. Louis at 7.28 the next morning. Another train leaves Chicago at 11.30 in the evening, reaching St. Louis at 8.04 next morning. In how much less time does one train run than the other, and which is the faster train?
6. A train leaves Chicago at 6.30 in the evening and reaches Omaha at 8.15 next morning. If 23 minutes are spent in stopping at stations, what is the actual running time from Chicago to Omaha?
7. A second train leaves Chicago at 10.30 in the evening and reaches Omaha at 4 o'clock the next afternoon. How much longer is this train on the way than the one which left Chicago at 6.30?

1. If a block containing 3 A. is 20 rods wide, how long is it? If it contains 10 lots, how many square rods in each?
2. A lot cost $200, the house cost $12\frac{1}{2}$ times as much as the lot, and the fence $\frac{1}{2}$ as much as the lot. What did the house and the fence together cost?
3. The battle of Lexington was fought April 19th, 1775. How many Aprils have there been from then to the present day?
4. The buildings for the Columbian Exposition were dedicated October 12th, 1892. How many years, months and days since then?
5. Nathaniel Hawthorne was born July 4th, 1809, and Texas was admitted to the Union July 4th, 1845. What was Hawthorne's age in months, when Texas became a state?
6. Daniel Webster was born January 18th, 1782, and James A. Garfield was born November 19th, 1831. How old was Webster when Garfield was born?
7. Memorial Day was first celebrated by order of John A. Logan, May 30th, 1868, and he was then 42 years, 3 months and 21 days old. When was he born?
8. Gen. Grant was born April 27th, 1822, and was 41 years, 2 months and 7 days old when Vicksburg, Miss., was captured. When did he capture Vicksburg?
9. Gen. Wm. T. Sherman was born Feb. 8th, 1820, and finished his great march through Georgia December 13th, 1864. How old was he on that day?
10. Gen. Sheridan was born March 6th, 1831, and made his famous ride from Winchester to the battlefield at Cedar Creek, October 19th, 1864. What was his age then?
11. The area of Illinois is 56,650 square miles and the area of the Philippine Islands is 114,326 square miles. How much more than twice as large as Illinois are the Philippines?

1. A grain dealer bought 25,000 bu. of wheat at 97¢ per bushel, and after 3 months sold it for $1.12 per bu. He paid storage charges at the rate of ½¢ per bu. each month. What was his gain?
2. A grain elevator holds 800,000 bu. If it is kept full for 6 months, what will storage charges amount to at ¼¢ per bu. each month?
3. Six vessels carry 800,000 bu. of grain from Chicago to Buffalo. If 2 of them carry 160,000 bu. each, what is the average load of the other four?
4. Wheat weighs 60 lbs. to the bushel. What is the weight in T. of 160,000 bu.? In cwt.?
5. At 6¢ per cwt. what does it cost to ship 120,000 bu. of wheat from Chicago to Buffalo?
6. An elevator containing 645,000 bu. of grain caught fire and the grain was damaged. The grain was worth 87¢ per bu. and was insured for $250,000. What was the loss?
7. The owner of the grain, after receiving the insurance money, sold the damaged grain for feed at 13¢ per bushel. What was his actual loss?
8. Corn weighs 56 pounds to the bushel. How many car loads of 15 tons each will fill a vessel that can carry 90,000 bu.?
9. At 10¢ per hundredweight, what will it cost to ship 90,000 bu. of corn from Chicago to New York City?
10. A vessel owner agrees to carry 125,000 bu. of corn for $3750. How much does he receive per hundredweight?
11. A builder received $127.25 for making some repairs to a house. He pays his 2 helpers $2.50 each per day for the 12 days needed to do the work. What is his own share of the money?

1. How many caps worth $33\frac{1}{3}¢$ each, can be bought for \$15? For \$24?
2. If the price of bread is raised from $5¢$ to $6¢$ per loaf, how much more will 700,000 loaves cost?
3. If a barrel of flour will make 196 loaves of bread, how many barrels are required to make 700,000 loaves?
4. A rapid-fire gun shoots 100 shells per minute, how many shells will 7 such guns shoot at the same rate in $\frac{1}{2}$ a minute? In $1\frac{1}{2}$ minutes?
5. If each shell weighs 1 lb., how many guns will it take to fire a ton of shells in 1 minute?
6. If each shell uses up 6 ounces of powder, how much powder will be used by 15 guns in 1 minute?
7. A man earning \$1.20 per day works 11 days in January, 17 days in February, 28 days in March, and 25 days in each of the next three months. How much does he earn in the six months?
8. A man working for \$12 per week puts in $\frac{1}{4}$ of a day overtime each day, for which he receives double pay. How much does he earn in 4 weeks if he works every working day?
9. What will the bricks for a wall 39 ft. high cost at \$5.25 per thousand, if one thousand bricks will carry up the wall 6 in.?
10. A brick mason earning $50¢$ per hour, works 7 hours on Monday, 5 hours on Tuesday, and full time — 8 hours a day — for the rest of the week. What is his pay for the week?
11. A gang of 20 men digging for a foundation are stopped by rain from half past 9 to a quarter past 10 o'clock. If they are working for $20¢$ per hour each, how much pay does each one lose? How much would they all lose at $25¢$ per hour?

1. Add 3 yd. 2 ft. 8 in., 4 yd. 1 ft. 4 in., and 3 yd. 2 ft. 6 in.

rd.	yd.	ft.	in.
	3	2	8
	4	1	4
	3	2	6
2	1	0	6
		2	1

Write the numbers in columns, putting *in.* under *in.*, *ft.* under *ft.*, etc. 8 in. + 4 in. + 6 in. = how many inches, or how many feet and inches? Where should the inches be written? What should be done with the 1 foot? 1 ft. + 2 ft. + 1 ft. + 2 ft. = how many feet, or how many yards and feet? Where should the number of feet be written? What should be done with the 2 yards? 2 yds. + 3 yds. + 4 yds. + 3 yds. = how many yards, or how many rods and yards? Where should the number of yards be written? The number of rods?

2. Subtract 2 yds. 2 ft. 8 in. from 4 yd. 1 ft. 10 in.

yd.	ft.	in.
4	1	10
2	2	8
1	2	2

Write the numbers as in addition, 10 in. − 8 in.= how many inches? 1 ft. − 2 ft. = ? How can 4 yd. and 1 ft. be changed without changing their meaning? 4 ft. − 2 ft. = how many feet? 3 yd. − 2 yd. = how many yards?

3. Multiply 1 yd. 2 ft. 5 in. by 3.

yd.	ft.	in.
1	2	5
		3
5	1	3
	2	1

3 times 5 inches = how many inches, or how many feet and inches? Where should the 3 inches be written? 3 times 2 ft. = how many feet? How many yards? How many feet were added from the first column? Where should the 1 foot be written? Where should the 2 yards be written? 3 times 1 yard = how many yds.? 3 yds. + 2 yds. = how many yds.?

4. Divide 7 yd. 2 ft. 8 in. by 2.

$\frac{1}{2}$ of 7 yd. = how many yards, or how many yards and feet? $\frac{1}{2}$ of 5 ft. = how many feet or how many feet and inches? $\frac{1}{2}$ of 20 inches = how many inches?

1. Add 12 sq. yd., 4 sq. ft., 120 sq. in.; 4 sq. yd., 7 sq. ft., 20 sq. in.; 6 sq. yd., 9 sq. ft., 16 sq. in.; 7 sq. ft., 4 sq. in.
2. Add 4 cu. yd., 9 cu. ft., 1200 cu. in.; 3 cu. yd., 400 cu. in.; 4 cu. ft., 600 cu. in.; 5 cu. yd., 12 cu. ft.
3. Add 15 gal., 3 qt., 1 pt., 3 gi.; 4 gal. 2 qt.; 6 qt., 1 pt., 2 gi.; 9 gal., 1 pt., 3 gi.
4. Add 3 bu., 3 pk., 7 qt., 1 pt.; 4 bu., 2 pk., 6 qt.; 3 pk., 4 qt., 1 pt.; 3 bu., 1 pk., 6 qt.; 1 pk., 2 qt., 1 pt.
5. Add 2 T., 16 cwt., 80 lb., 8 oz.; 1 T., 8 cwt., 15 lb., 6 oz.; 3 T., 10 cwt., 50 lb., 8 oz.; 18 cwt., 90 lb., 4 oz.
6. Add 4 hr., 45 min., 15 sec.; 6 hr., 30 min.; 55 min., 45 sec.; 3 hr., 30 sec.
7. Subtract 16 sq. yd., 7 sq. ft., 44 sq. in., from 24 sq. yd., 5 sq. ft., 120 sq. in.
8. Subtract 3 cu. yd., 9 cu. ft., 680 cu. in., from 12 cu. yd., 6 cu. ft., 1240 cu. in.
9. Subtract 1 gal., 3 qt., 1 pt., 3 gi., from 4 gal., 2 qt., 1 pt., 1 gi.
10. Subtract 2 bu., 2 pk., 5 qt., 1 pt., from 6 bu., 3 pk., 4 qt., 1 pt.
11. Subtract 2 T., 15 cwt., 15 lb., 9 oz., from 4 T., 12 cwt., 20 lb., 8 oz.
12. Multiply 9 cu. yd., 8 cu. ft., 640 cu. in., by 4.
13. Multiply 6 gal., 3 qt., 1 pt., 3 gi., by 5.
14. Multiply 5 bu., 3 pk., 7 qt., by 2.
15. Multiply 2 T., 10 cwt., 60 lb., 12 oz., by 3.
16. Multiply 4 hr., 40 min., 30 sec., by 5.
17. Divide 16 sq. yd., 3 sq. ft., 141 sq. in., by 3.
18. Divide 19 cu. yd., 1 cu. ft., 216 cu. in., by 9.
19. Divide 26 gal., 3 qt., 2 gi., by 6.
20. Divide 12 bu., 1 pk., 3 qt., by 5.
21. Divide 12 T., 3 cwt., 50 lb., by 10.

1. A train traveled 32 mi., 120 rd., 7 yd., one hour, and 30 mi. 160 rd., 4 yd., the next. How far did it travel in the two hours?
2. A man built 4 yd., 1 ft., 8 in., of walk at one time, and 3 yd., 2 ft., 6 in., at another. How much did he build?
3. One field contains 6 A., 80 sq. rd., and 40 sq. yd.; the field beside it contains 14 A., 120 sq. rd., $20\frac{1}{2}$ sq. yd. If the fields are joined into one, how much land will it contain?
4. A building whose area is 30 sq. yd., 6 sq. ft., 72 sq. in., is enlarged by an addition whose area is 9 sq. yd., 8 sq. ft., 72 sq. in. What is the area of the entire building?
5. One room contains 185 cu. yd., 7 cu. ft., 192 cu. in. of air; another 172 cu. yd., 4 cu. ft., 432 cu. in.; a third 864 cu. yd., 2 cu. ft., 192 cu. in. If the air in all the rooms is entirely changed once every hour, how much air will be required in 1 hour?
6. Before buying, a grocer had 2 gal., 2 qt., 1 pt. of vinegar; he purchased 7 gal., 3 qt., 1 pt. more. How much had he then?
7. A farmer raised 56 bu., 3 pk. of Irish potatoes, and 24 bu., 2 pk. of sweet potatoes. How many had he in all?
8. One family used 1 T. 13 cwt. 50 lb. of ice in one summer, another family used 1 T. 9 cwt. 75 lb. How much did they both use?
9. A steamship made the first half of a trip in 6 d. 10 hr. 45 min. and the return trip in 7 d. 3 hr. 15 min. If 2 d. 6 hr. 30 min. were spent in port before returning, in what time did the ship make the entire trip?
10. A boy rode 10 mi. 80 rd. 4 yd. in 1 hour, and 2 mi. 120 rd. 3 yd. less the next hour. How far did he ride the second hour?

1. A man owning a farm of 740 A. and 78 sq. rd. sold 290 A. and 98 sq. rd. How large was his farm then?
2. In a bin holding 7 cu. yd. 9 cu. ft. 576 cu. in. a partition was placed separating a part holding 3 cu. yd. 18 cu. ft. 1152 cu. in. What were the contents of the remaining part?
3. From a cistern holding 10 bbl. 14 gal. 1 qt. of water, a quantity was taken out, leaving 2 bbl. 8 gal. 3 qt. in the cistern. How much was taken out?
4. A grocer bought 12 bu. 1 pk. of potatoes and 4 bu. 3 pk. less of apples. How many apples did he buy?
5. From a load of grain weighing 2 T. 14 cwt. 30 lb., 1 T. 18 cwt. 80 lb. were removed. What was the weight of the remaining part?
6. One train made a trip in 14 hr. 15 min. 25 sec.; another train made the same trip in 1 hr. 50 min. 45 sec. less time. In what time was the trip made by the second train?
7. Two boats left the same port at the same time, one sailed 21 mi. $5\frac{1}{2}$ yd. while the second sailed twice as far. How far did the second one sail?
8. A building whose area was 27 sq. yd. 3 sq. ft. 72 sq. in. was torn down and another built whose area was three times that of the old one. What was the area of the new building?
9. In digging a cellar, 24 cu. yd. 3 cu. ft. 576 cu. in. of earth were excavated; it was then determined to make the cellar three times as large. How much more earth was removed? How much in all?
10. A book dealer shipped 3 boxes of books. One weighed 1 cwt., 90 lb., 8 oz.; the second weighed twice as much as the first, and the third as much as both the others together. What was the weight of each?

(COPY OF BILL.)

Chicago, June 1, 1898

Albert Miller,

Bought of JOHN SAMPLE, BOOKSELLER

3	Books	@ .35	$1	05
2	Tablets	@ 10		20
4	Pencils	@ 05		20
		Total	1	45

(COPY OF RECEIPTED BILL.)

Chicago, Dec. 23, 1897

Miss Edna Lane,

Bought of PRINCE'S TOY STORE

2	Dolls	@ .69	$1	38
3	Sets Toy Dishes	@ .87	2	61
1	Music Box		1	35
$1\frac{1}{2}$	Doz. Xmas Cards	@ .54		81
	Total		6	15

Received Payment,
Prince's Toy Store.

Copy, find amounts due on the following accounts, and receipt.

J. MANNING,

In account with D. L. PARMER, Dr.

1898.

Jan.	2	To 75 lbs. Rice	@	$ .04		
"	2	" 330 lbs. Sugar	@	.05		
"	7	" 50 lbs. Java Coffee	@	.32		
"	7	" 45 lbs. Tea	@	.60		
		Amount due,	-	-		

JAMES GILMAN,

In account with GEO. JOHNSON, Dr.

1898.

May	6	To 5 Days' Work	@	$2.50		
"	13	" 12 lbs. Nails	@	.03		
"	14	" 7 Panes of Glass	@	.40		
June	11	" 10 gals. Paint	@	1.00		
"	18	" Job Work on House			275	00
		Amount due,	-	-		

1. Make bills for the following:

Feb. 4, Mrs. J. K. Brown bought of White, Jones & Co.:

10	lbs. of Sugar	@	$.05
20	" Flour	@	.04
2	" Tea	@	.60

Jan. 11, L. B. Hall bought of Smith Bros.:

20	pr. Boys' Boots	@	$1.75
15	" Slippers	@	1.50
25	" Ladies' Shoes	@	2.75
25	" Rubbers	@	.50

June 4, Messrs. Black & Co. bought of Marshall Field & Co.:

3	bolts of Velvet	@	$100.00
3	" Muslin	@	37.00
2	" Calico	@	10.00

May 5, L. French bought of Browne, Steele & Co.:

5	yds. of Silk	@	$1.75
3	" Ribbon	@	.75
12	" Gingham	@	.12
7	" Velvet	@	4.50
15	" Calico	@	.05
4	papers Pins	@	.07
2	" Needles	@	.08

Sept. 1, J. C. Hill bought of Birch & Son:

8	Histories	@	$1.25
15	Spellers	@	.25
9	Readers	@	.40
12	Grammars	@	.60
20	Arithmetics	@	.55

Oct. 21, O. F. Horn bought of Taylor & Co.:

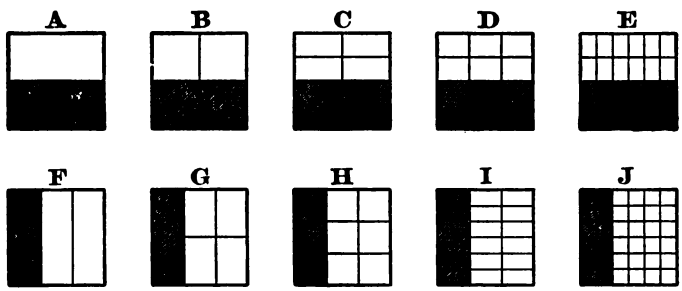
5	Coal Stoves	@	$20.00
10	Oil Stoves	@	8.00
25	lbs. Nails	@	.04

1. Make out bills, supplying names, find the amounts, and receipt:

9 lbs. of Ham		@	$.16
8	" Veal	@	.12
12	" Mutton	@	.12½
16	" Beef	@	.14
4	" Pork	@	.08⅓
13 lbs. of Dried Beef		@	$.12
25	" Codfish	@	.11
16	" Mackerel	@	.06¼
18	" Bacon	@	.12½
30 yds. of Cassimere		@	$1.75
70 Spools Thread		@	.03½
64 yds. Sheeting		@	.12
45	" Calico	@	.04
5 Table Cloths		@	2.50
112 bbl. Flour		@	$ 6.20
108 tons of Hay		@	14.00
250 bu. Wheat		@	.92
130	" Corn	@	.32½
75	" Barley	@	.85
12 doz. Eggs		@	$.12½
12 lbs. Rice		@	.04
48	" Coffee	@	.33⅓
15	" Butter	@	.22
32	" Cheese	@	.14
6 rolls of Wall Paper		@	$.20
8 qts. Paint		@	.30
6	" Oil	@	.15

1. Charles sleeps $\frac{1}{3}$ of the 24 hours, is in school $\frac{1}{4}$ of the 24 hours, works for his mother $\frac{1}{24}$ of the 24 hours, and uses $\frac{1}{12}$ of the 24 in eating. How many hours does he sleep? Go to school? Work for his mother? Use in eating? Use in other ways?
2. Tom read $\frac{1}{3}$ of a book on Sunday, $\frac{1}{6}$ on Tuesday, and $\frac{1}{9}$ on Wednesday. What part was read in these 3 days? What part was not read?
3. If Tom's book had in it 324 pages, how many pages did he read on Sunday? On Monday? On Tuesday? How many pages were left unread?
4. Fred bought $1\frac{1}{2}$ dozen eggs on Monday, and 3 times as many on Tuesday. On Wednesday he sold $2\frac{1}{4}$ dozens. How many dozens had he left?
5. Felix had a small fruit-stand. He bought at different times: $2\frac{1}{3}$ dozen oranges; $1\frac{5}{6}$ dozen oranges; $3\frac{2}{3}$ dozen oranges, and $5\frac{1}{2}$ dozen oranges. How many oranges did he buy each time? How many in all? How many dozens in all?
6. A clerk in a small grocery store sold these quantities of sugar: 4 pounds 4 ounces; $3\frac{1}{2}$ pounds; 5 pounds 12 ounces; $7\frac{3}{4}$ pounds. How many ounces did he sell each time? How many pounds and parts of a pound did he sell in all?
7. A woman asked the meat-market clerk for a 6-pound roast. When he had weighed it he charged her \$.78, and the meat was 12 cents a pound. How much did it weigh? How much more did it weigh than it should have weighed?
8. When butter is 32 cents a pound, what is the difference in price between $4\frac{1}{2}$ pounds and $4\frac{1}{8}$ pounds?
9. A rug 15 feet long is $\frac{2}{3}$ as wide as it is long. How many feet wide is it?

1. Mary bought $\frac{1}{2}$ pound of chocolate creams, and Anna bought $\frac{1}{4}$ of a pound more than Mary. What part of a pound did Anna buy? Did both girls buy?
2. Charles bought $1\frac{1}{2}$ pounds of sweet potatoes one day, $1\frac{3}{4}$ pounds the next day, and $2\frac{1}{2}$ pounds another day. How many pounds of sweet potatoes did he buy in the 3 days?
3. Ellen used $1\frac{1}{3}$ yards of ribbon for her hair, $1\frac{2}{3}$ yards for a neck ribbon, and $3\frac{5}{6}$ yards for a sash. In all how many yards of ribbon did she use?
4. Ross had a kite string $30\frac{1}{2}$ yards long. He gave Carl $13\frac{3}{4}$ yards of it. How many yards were left for Ross?
5. Grace bought $7\frac{5}{6}$ yards of ribbon; she gave $2\frac{1}{2}$ yards to Bessie, and $1\frac{2}{3}$ yards to May. How many yards did Grace give away? How many yards had she left?
6. Carl had $\$15\frac{1}{2}$, and he bought a football suit for $\$5\frac{3}{4}$. How many dollars and parts of a dollar had he left?
7. Nellie's mother canned $3\frac{3}{4}$ gallons of pears, $1\frac{5}{8}$ gallons of peaches, $2\frac{3}{8}$ gallons of plums, and $5\frac{1}{2}$ gallons of different kinds of berries. How many gallons of fruit did she can in all?
8. From a keg having in it $2\frac{1}{3}$ gallons of cider, $1\frac{5}{8}$ gallons were sold. How many gallons were unsold?
9. Four sizes of jars were on a shelf. The first size held $\frac{1}{2}$ pint; the second held $1\frac{1}{2}$ times as much as the first; the third held twice as much as the second, and the fourth held 4 times as much as the first. How much did the second hold? The third? The fourth? How much did 4 of the jars, 1 of each size, hold?
10. Walter spent $\frac{3}{4}$ of an hour studying his arithmetic, $\frac{1}{3}$ as long studying his spelling, and twice as long studying his geography as studying his spelling. How many hours and parts of an hour did he spend on the 3 studies?

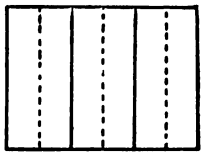


1. Into how many parts is A divided, and what is one part called?
2. How many parts, and what is one called, in B? C? D? E? F? G? H? I? J?
3. One part of A equals how many parts of B? C? D? E? G? I? J?
4. One part of F equals how many parts of G? H? I? J? D? E?
5. The number below the line of a fraction is the denominator, and indicates into how many equal parts anything is divided. Thus, as one of the parts of B is $\frac{1}{4}$, the denominator, $_4$, shows that B is divided into 4 equal parts; as one part of G is $\frac{1}{6}$, the denominator, $_6$, shows that G is divided into 6 equal parts; etc.
6. The number above the line is the numerator, and indicates how many parts are taken. Thus, in $\frac{2}{4}$ of B, the numerator, ^{2}, shows that 2 of the 4 equal parts are taken; in $\frac{2}{6}$ of G, the numerator, ^{2}, shows that 2 of the 6 equal parts are taken; etc.
7. What is the sum of $\frac{1}{2}$ and $\frac{1}{4}$? $\frac{1}{2}$ and $\frac{1}{8}$? $\frac{1}{2}$ and $\frac{1}{24}$? $\frac{1}{2}$ and $\frac{1}{6}$? $\frac{1}{2}$ and $\frac{1}{18}$?
8. How did you add $\frac{1}{2}$ and $\frac{1}{8}$?
9 It has already been seen that fractions, in order to be added, must have the same denominator.

1. Add $\frac{1}{2}$ and $\frac{1}{3}$. Study Figure G, p. 242.
2. In $\frac{1}{2}$ there are how many $\frac{1}{6}$'s? In $\frac{1}{3}$ there are how many $\frac{1}{6}$'s?
3. How many $\frac{1}{6}$'s are there in $\frac{1}{2}$ and $\frac{1}{3}$ together?
4. What is the difference between $\frac{1}{2}$ and $\frac{1}{4}$?
5. What is the difference between $\frac{1}{2}$ and $\frac{1}{6}$?
6. What is the difference between $\frac{1}{3}$ and $\frac{1}{6}$?
7. What is the difference between $\frac{1}{2}$ and $\frac{1}{3}$?
8. What is the sum of $\frac{1}{2}$, $\frac{1}{3}$ and $\frac{1}{6}$?
9. What is the sum of $\frac{1}{3}$, $\frac{1}{6}$ and $\frac{1}{8}$?
10. What is the sum of $\frac{1}{3}$ and $\frac{1}{9}$?
11. What is the sum of $\frac{1}{6}$ and $\frac{1}{9}$?
12. What is the sum of $\frac{1}{2}$, $\frac{1}{3}$ and $\frac{1}{9}$?
13. What is the difference between $\frac{1}{2}$ and $\frac{1}{9}$?
14. What is the difference between $\frac{1}{3}$ and $\frac{1}{8}$?
15. What is the difference between $\frac{1}{2}$ and $\frac{3}{8}$? Between $\frac{2}{3}$ and $\frac{1}{2}$? Between $\frac{3}{4}$ and $\frac{1}{2}$? Between $\frac{5}{8}$ and $\frac{1}{4}$? Between $\frac{5}{6}$ and $\frac{1}{3}$?
16. If $\frac{3}{4}$ of a yard of ribbon costs $21¢$, what is the cost of $\frac{1}{4}$ of a yard? The cost of $\frac{1}{2}$ of a yard equals what part of the cost of $\frac{3}{4}$ of a yard?
17. John worked $\frac{1}{2}$ of the day Monday, $\frac{3}{4}$ of the day Tuesday, and $\frac{1}{3}$ of the day Wednesday. How many days did he work altogether?
18. A girl having $\frac{3}{4}$ of a yard of ribbon bought $\frac{1}{8}$ more. What part of a yard had she then?
19. If from $\frac{7}{8}$ of a gallon of milk $\frac{1}{4}$ of a gallon is taken, what part of a gallon is left?
20. A boy studied $1\frac{1}{2}$ hours Monday, $1\frac{1}{4}$ hours Tuesday, and $1\frac{7}{8}$ hours Wednesday. How long did he study during the three days? How much longer Monday than Tuesday? How much longer Wednesday than either Monday or Tuesday?

1. If $\frac{2}{3}$ of a yard of cloth cost \$.96, how much will $\frac{1}{6}$ of a yard cost?
2. A girl walked $\frac{2}{3}$ of a mile, and after resting walked $\frac{1}{6}$ of a mile farther. What part of a mile did she walk in all?
3. A man traveled $1\frac{1}{6}$ miles east, returned, and then went $\frac{1}{2}$ a mile west. How far did he travel?
4. From a piece of cloth $24\frac{2}{3}$ yds. long, $6\frac{1}{3}$ yds. were sold to one customer and $8\frac{1}{6}$ yds. to another. How many yards remained?
5. One box weighs $5\frac{1}{2}$ lbs., a second box, 3 times as much as the first, and a third, $\frac{1}{2}$ as much as the second. What is the weight of the second and the third box?
6. A family uses $3\frac{1}{2}$ cwt. of ice one week, $2\frac{1}{3}$ cwt. the next week. How much do they use in the 2 weeks?
7. How many jars holding $\frac{1}{3}$ of a gal. each can be filled from $3\frac{2}{3}$ gals. of water?
8. A boy attends school $\frac{5}{6}$ of the yr.; $\frac{1}{2}$ of his vacation is spent in the country. What part of the year does he spend in the country?
9. A grocer having $4\frac{1}{2}$ crates of berries sold $\frac{3}{4}$ of them. How many had he left?
10. A milkman sells $\frac{3}{4}$ of a pt. of cream and $1\frac{1}{2}$ qts. of milk a day to each of 2 families. How much cream does he sell to both in four days? How much milk?
11. One girl was absent from school $\frac{1}{3}$ of a month; another girl was absent $\frac{1}{2}$ as long. What part of the month was the second girl absent?
12. How many bean bags, each requiring $\frac{1}{8}$ of a yd. of cloth, can be made from $\frac{1}{4}$ of a yd.? From $\frac{1}{2}$ a yd.? From $\frac{3}{4}$ of a yd.? $\frac{7}{8}$ of a yd.?
13. A man when traveling spent $\frac{3}{4}$ of a yr. in England; $\frac{1}{3}$ of a yr. in France, $\frac{1}{6}$ of a yr. in Germany, and $\frac{3}{4}$ of a yr. in Italy. How many yrs. in all?

1. A woman bought $4\frac{1}{2}$ qt. of berries, $3\frac{1}{4}$ qt. of currants, and $2\frac{1}{8}$ qt. of cherries. How many quarts of fruit did she buy?
2. In making a garden, a man planted $\frac{1}{4}$ A. in cabbages, $\frac{1}{8}$ A. in peas, $\frac{1}{16}$ A. in beans, and $\frac{1}{32}$ A. in tomatoes. How much land did he plant in all?
3. A girl spent $\frac{1}{3}$ of the summer in the country, $\frac{2}{9}$ of it in the mountains, and the rest of it at home. What part of the summer was she at home?
4. While canning peaches, a woman cut 12 peaches into halves and 12 into thirds. How many halves were there? How many thirds? How many more thirds than halves? How many thirds equal four halves? Six halves? Eight halves? Ten? Twelve?
5. A man traveled $\frac{1}{3}$ of a certain distance by boat, $\frac{4}{9}$ by train, and walked $\frac{1}{2}$ the remaining distance. What part of the distance did he walk?
6. From a lot of $5\frac{1}{2}$ doz. pairs of shoes, $2\frac{1}{2}$ doz. were sold at one price, and the rest at another price. How many dozen were sold at the second price?
7. A man built $4\frac{1}{2}$ yd. of fence one day and $1\frac{1}{16}$ yd. less the next. How many yards did he build the second day?
8. The area of a building was $30\frac{1}{4}$ sq. yd.; an addition $\frac{1}{3}$ as large as the building, was made. What was the area of the addition?
9. How many square feet of tile will be needed for the floors of two rooms, each containing $18\frac{1}{6}$ sq. ft.?
10. A boy spent $\frac{3}{4}$ of every year at college, for 4 years. How much time did he spend there in all?
11. A carpenter bought 528 ft. of lumber, used $\frac{1}{4}$ of it, sold $\frac{1}{3}$ of the remainder, and stored what was left. What part did he sell? What part did he keep? How many feet did he keep?



A

1. $\frac{2}{3} + \frac{1}{6} = ?$
2. Show $\frac{1}{3}$ of the rectangle A; $\frac{2}{3}$ of it; $\frac{3}{3}$; $\frac{1}{6}$; $\frac{3}{6}$; $\frac{4}{6}$. Show how many sixths there are in $\frac{1}{3}$ of the rectangle; in $\frac{2}{3}$ of it.
3. Show how many $\frac{1}{6}$'s there are in $\frac{2}{3}$ and $\frac{1}{6}$ of the rectangle A; in $\frac{2}{3} - \frac{1}{6}$ of the rectangle.

$$\frac{2}{3} + \frac{1}{6} = ?$$
$$\frac{2}{3} - \frac{1}{6} = ?$$

4. In the same way find

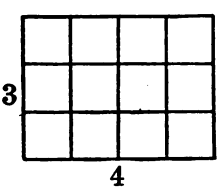
$$\frac{2}{3} + \frac{2}{9}; \quad \frac{2}{3} - \frac{2}{9}.$$

5. Find also $\frac{3}{5} + \frac{3}{10}$; $\frac{3}{5} + \frac{1}{15}$; $\frac{3}{5} - \frac{3}{10}$; $\frac{3}{5} - \frac{2}{15}$.
6. Find the sums, using a divided rectangle if necessary:

(1) $\frac{1}{4} + \frac{3}{4}$;	(5) $\frac{1}{2} + \frac{1}{4}$;	(9) $\frac{5}{8} + \frac{3}{16}$;	(13) $\frac{2}{3} + \frac{1}{6}$;
(2) $\frac{1}{6} + \frac{5}{6}$;	(6) $\frac{1}{3} + \frac{1}{6}$;	(10) $\frac{3}{7} + \frac{2}{21}$;	(14) $\frac{4}{5} + \frac{2}{15}$;
(3) $\frac{2}{7} + \frac{3}{7}$;	(7) $\frac{1}{5} + \frac{3}{10}$;	(11) $\frac{5}{6} + \frac{5}{18}$;	(15) $\frac{3}{4} + \frac{3}{16}$;
(4) $\frac{4}{9} + \frac{2}{3}$;	(8) $\frac{2}{7} + \frac{3}{14}$;	(12) $\frac{7}{8} + \frac{1}{24}$;	(16) $\frac{3}{8} + \frac{5}{24}$.

7. Find the differences, using rectangle when needed

(1) $\frac{2}{3} - \frac{1}{3}$;	(5) $\frac{3}{9} - \frac{4}{9}$;	(9) $\frac{5}{6} - \frac{5}{12}$;	(13) $\frac{6}{7} - \frac{3}{14}$;
(2) $\frac{4}{5} - \frac{2}{5}$;	(6) $\frac{2}{3} - \frac{1}{6}$;	(10) $\frac{7}{9} - \frac{1}{18}$;	(14) $\frac{6}{11} - \frac{7}{22}$;
(3) $\frac{7}{8} - \frac{3}{8}$;	(7) $\frac{3}{4} - \frac{3}{8}$;	(11) $\frac{7}{8} - \frac{5}{16}$;	(15) $\frac{9}{10} - \frac{3}{20}$;
(4) $\frac{6}{6} - \frac{1}{6}$;	(8) $\frac{7}{10} - \frac{3}{10}$;	(12) $\frac{7}{9} - \frac{1}{27}$;	(16) $\frac{15}{16} - \frac{3}{26}$.



8. $\frac{3}{4} + \frac{2}{3} = ?$ $\frac{3}{4} - \frac{2}{3} = ?$
Show $\frac{1}{4}$ of the rectangle; $\frac{2}{4}$ of it; $\frac{3}{4}$; $\frac{1}{3}$; $\frac{2}{3}$. Into how many squares is the rectangle divided? One of these squares is what part of the rectangle?

How many $\frac{1}{12}$'s are there in $\frac{1}{4}$ of the rectangle? in $\frac{3}{4}$? in $\frac{1}{3}$? in $\frac{2}{3}$? in $\frac{3}{4} + \frac{2}{3}$? in $\frac{3}{4} - \frac{2}{3}$?

1. Find the following sums and differences, using a rectangle when needed:

(1) $\frac{3}{5}+\frac{2}{3}$;	(6) $\frac{4}{5}-\frac{2}{3}$;	(11) $\frac{3}{5}+\frac{1}{4}$;	(16) $\frac{5}{8}+\frac{3}{7}$;
(2) $\frac{4}{5}+\frac{2}{3}$;	(7) $\frac{5}{6}-\frac{2}{5}$;	(12) $\frac{3}{5}+\frac{3}{7}$;	(17) $\frac{5}{8}-\frac{3}{7}$;
(3) $\frac{5}{6}+\frac{2}{5}$;	(8) $\frac{1}{6}-\frac{1}{7}$;	(13) $\frac{5}{6}-\frac{3}{5}$;	(18) $\frac{3}{8}+\frac{1}{6}$;
(4) $\frac{1}{6}+\frac{1}{7}$;	(9) $\frac{4}{5}+\frac{2}{7}$;	(14) $\frac{5}{6}+\frac{1}{7}$;	(19) $\frac{3}{7}+\frac{4}{5}$;
(5) $\frac{4}{5}-\frac{2}{3}$;	(10) $\frac{4}{5}-\frac{2}{7}$;	(15) $\frac{7}{8}-\frac{2}{3}$;	(20) $\frac{6}{11}+\frac{5}{6}$.

Notice that to add or subtract two fractions as $\frac{4}{5}$ and $\frac{2}{3}$, that is to find $\frac{4}{5}+\frac{2}{3}$ and $\frac{4}{5}-\frac{2}{3}$, we could more quickly do this:

$$\frac{4}{5}+\frac{2}{3}=\frac{4\times3}{5\times3}+\frac{2\times5}{3\times5}=\frac{12}{15}+\frac{10}{15}=\frac{22}{15}=1\frac{7}{15},$$

and $$\frac{4}{5}-\frac{2}{3}=\frac{4\times3}{5\times3}-\frac{2\times5}{3\times5}=\frac{12}{15}-\frac{10}{15}=\frac{2}{15}.$$

2. In this way find these sums and differences:

(1) $\frac{5}{6}+\frac{2}{5}$;	(6) $\frac{3}{8}-\frac{1}{5}$;	(11) $\frac{11}{12}-\frac{3}{5}$;	(16) $\frac{12}{15}+\frac{15}{20}$;
(2) $\frac{5}{6}-\frac{2}{5}$;	(7) $\frac{7}{9}+\frac{1}{4}$;	(12) $\frac{11}{12}+\frac{2}{5}$;	(17) $2\frac{1}{4}+1\frac{1}{2}$;
(3) $\frac{4}{5}+\frac{1}{3}$;	(8) $\frac{7}{9}-\frac{1}{4}$;	(13) $\frac{11}{12}-\frac{8}{11}$;	(18) $3\frac{1}{2}+1\frac{1}{4}$;
(4) $\frac{4}{5}-\frac{1}{3}$;	(9) $\frac{6}{10}+\frac{4}{5}$;	(14) $\frac{11}{12}+\frac{9}{11}$;	(19) $8\frac{3}{4}-6\frac{1}{2}$;
(5) $\frac{3}{8}+\frac{1}{5}$;	(10) $\frac{4}{5}-\frac{2}{7}$;	(15) $\frac{7}{16}-\frac{2}{5}$;	(20) $10\frac{3}{5}-7\frac{1}{5}$.

A number like $8\frac{3}{4}$, which is made up of a whole number and a fraction, is called a *mixed* number.

To add or subtract such numbers, first add or subtract the fractions, then add or subtract the whole numbers and add the two results. Thus:

3. Add:

$$\begin{array}{rcl} 9\frac{3}{4} & = & 9\frac{9}{12} \\ 6\frac{2}{3} & = & 6\frac{8}{12} \\ \hline 16\frac{5}{12} & = & 15\frac{17}{12} \end{array}$$

$9\frac{3}{4}=9\frac{9}{12}$ and $6\frac{2}{3}=6\frac{8}{12}$. $\frac{9}{12}$ and $\frac{8}{12}=\frac{17}{12}=1\frac{5}{12}$. $9+6=15$. Then $15+1\frac{5}{12}=16\frac{5}{12}$.

4. Subtract:

$$\begin{array}{rl} 9\frac{3}{4}=8\frac{7}{4}= & 8\frac{35}{20} \\ \underline{6\frac{4}{5}} \quad = & \underline{6\frac{16}{20}} \\ & 2\frac{19}{20} \end{array}$$

Since $\frac{3}{4}=\frac{15}{20}$ and $\frac{4}{5}=\frac{16}{20}$, 1 or $\frac{4}{4}$ is taken from the 9 and added to $\frac{3}{4}$, giving $\frac{7}{4}$. $9\frac{3}{4}$ is then the same as $8\frac{7}{4}$ or $8\frac{35}{20}$. $\frac{16}{20}$ taken from $\frac{35}{20}$ leaves $\frac{19}{20}$ and 6 from 8 leaves 2. The difference is $2\frac{19}{20}$.

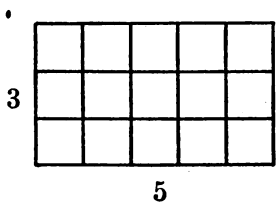
1. Solve these exercises like those on p. 257:

(1) $6\frac{2}{3} + 2\frac{4}{5} = ?$ (5) $8\frac{1}{3} - 5\frac{2}{3} = ?$ (9) $18\frac{7}{8} + 6\frac{9}{10} = ?$

(2) $5\frac{1}{8} + 3\frac{2}{3} = ?$ (6) $10\frac{1}{2} - 8\frac{4}{5} = ?$ (10) $20\frac{2}{5} - 15\frac{4}{5} = ?$

(3) $4\frac{1}{4} - 2\frac{1}{2} = ?$ (7) $12\frac{1}{2} - 6\frac{2}{3} = ?$ (11) $33\frac{1}{3} - 16\frac{2}{3} = ?$

(4) $12\frac{2}{3} - 6\frac{3}{4} = ?$ (8) $15\frac{5}{6} + 7\frac{1}{3} = ?$ (12) $66\frac{2}{3} - 6\frac{1}{4} = ?$



2. $2 \times \frac{1}{3}$ of the rectangle equals what part of the rectangle?

3. $2 \times \frac{2}{5} = ?$ $3 \times \frac{1}{5} = ?$ $4 \times \frac{2}{5} = ?$ $6 \times \frac{1}{8} = ?$ $7 \times \frac{3}{25} = ?$ $4 \times \frac{2}{3} = ?$ $16 \times \frac{1}{8} = ?$

Such an expression as $\frac{2}{3} \times \frac{4}{5}$ means $\frac{2}{3}$ of $\frac{4}{5}$, but it is usually read "$\frac{2}{3}$ times $\frac{4}{5}$."

4. $\frac{2}{3} \times \frac{4}{5}$, or $\frac{2}{3}$ of $\frac{4}{5} = ?$

Show $\frac{1}{5}$ of the rectangle; $\frac{2}{5}$ of it; $\frac{4}{5}$ of it; $\frac{1}{3}$ of $\frac{4}{5}$ of it.

What part of the whole rectangle is one of the small squares? How many of these squares in $\frac{1}{3}$ of $\frac{4}{5}$ of the rectangle?

What part of the whole rectangle is $\frac{1}{3}$ of $\frac{4}{5}$ of the rectangle? $\frac{2}{3}$ of $\frac{4}{5}$ of it? $\frac{2}{3} \times \frac{4}{5} = ?$

5. $\frac{3}{4} \times \frac{5}{6} = ?$

Divide a rectangle into 6 equal parts by lines running across it one way and into 4 equal parts by lines running across it the other way; and show first what part of the whole rectangle $\frac{1}{4}$ of $\frac{5}{6}$ of it is and then what part $\frac{3}{4}$ of $\frac{5}{6}$ of it is. $\frac{3}{4} \times \frac{5}{6} = ?$ A quick way is to do this: $\frac{3}{4} \times \frac{5}{6} = \frac{3 \times 5}{4 \times 6} = \frac{15}{24}$, or $\frac{5}{8}$. Show on a rectangle that $\frac{15}{24} = \frac{5}{8}$.

1. Solve these exercises:

(1) $\frac{2}{3} \times \frac{4}{7} = ?$ (6) $\frac{6}{7} \times \frac{8}{11} = ?$ (11) $1\frac{2}{3} \times 1\frac{1}{3} = ?$

(2) $\frac{2}{6} \times \frac{1}{3} = ?$ (7) $1\frac{5}{12} \times \frac{7}{8} = ?$ (12) $\frac{2}{3} \times \frac{2}{3} = ?$

(3) $\frac{5}{6} \times \frac{7}{8} = ?$ (8) $1\frac{1}{12} \times \frac{6}{7} = ?$ (13) $\frac{4}{5} \times \frac{4}{5} = ?$

(4) $\frac{3}{4} \times \frac{7}{8} = ?$ (9) $\frac{4}{5} \times \frac{7}{11} = ?$ (14) $\frac{7}{8} \times 1\frac{7}{9} = ?$

(5) $\frac{3}{2} \times \frac{5}{7} = ?$ (10) $\frac{6}{7} \times \frac{8}{13} = ?$ (15) $1\frac{1}{12} \times 1\frac{1}{12} = ?$

2. $\frac{3}{4} \div \frac{2}{5} = ?$ or $\frac{\frac{3}{4}}{\frac{2}{5}}$, means $\frac{3}{4}$ divided by $\frac{2}{5}$ equals what?

Solution:

$\frac{3}{4} = \frac{15}{20} = 15$ twentieths.

$\frac{2}{5} = \frac{8}{20} = 8$ twentieths.

15 twentieths $\div$ 8 twentieths $= 1\frac{5}{8}$.

The work may be arranged thus:

$$\frac{\frac{3}{4}}{\frac{2}{5}} = \frac{\frac{15}{20}}{\frac{8}{20}} = \frac{15 \text{ twentieths}}{8 \text{ twentieths}} = \frac{15}{8}.$$

Notice the 20 is found by multiplying together the numbers below the line (the *denominators*). The 15 is found by multiplying the 3 by the 5 and the 8 by multiplying the 2 by the 4.

3. Solve these exercises:

(1) $\frac{1}{2} \div \frac{2}{3} = ?$ (11) $\frac{8}{9} \div \frac{2}{5} = ?$

(2) $\frac{2}{3} \div \frac{3}{4} = ?$ (12) $\frac{8}{9} \div \frac{4}{5} = ?$

(3) $\frac{4}{5} \div \frac{2}{5} = ?$ (13) $\frac{8}{9} \div \frac{3}{5} = ?$

(4) $\frac{3}{5} \div \frac{2}{5} = ?$ (14) $\frac{7}{8} \div \frac{3}{4} = ?$

(5) $\frac{4}{7} \div \frac{2}{7} = ?$ (15) $\frac{6}{7} \div \frac{3}{5} = ?$

(6) $\frac{39}{5} \div \frac{4}{5} = ?$ (16) $1\frac{1}{2} \div \frac{7}{8} = ?$

(7) $\frac{7}{8} \div \frac{2}{5} = ?$ (17) $1\frac{2}{3} \div \frac{1}{2} = ?$

(8) $\frac{5}{7} \div \frac{2}{3} = ?$ (18) $1\frac{4}{15} \div \frac{7}{9} = ?$

(9) $\frac{6}{11} \div \frac{1}{2} = ?$ (19) $2\frac{5}{8} \div 1\frac{1}{2} = ?$

(10) $\frac{3}{7} \div \frac{4}{5} = ?$ (20) $2\frac{1}{16} \div \frac{5}{4} = ?$

1. What part of a dollar is 50¢? 25¢? 10¢? 1¢?
2. How do you write 1¢ as a fraction of a dollar? How do you write it with the dollar sign ($)?
3. How do you write 10¢ as a fraction of a dollar? With the dollar sign?
4. How do you write 25¢ as a fraction of a dollar? With the dollar sign? 50¢ as a fraction of a dollar? With the dollar sign?

   $.01 = $\frac{1}{100}$ of a dollar?

   .10 = $\frac{10}{100}$ or $\frac{1}{10}$ of a dollar?

   .25 = $\frac{25}{100}$ of a dollar?

   .50 = $\frac{50}{100}$ or $\frac{5}{10}$ of a dollar?
5. The period used between figures when writing dollars and cents is called the decimal point.
6. It is much easier to write cents with the decimal point than as fractions of a dollar.

   1¢ = $\frac{1}{100}$ of a dollar = .01 of a dollar.

   10¢ = $\frac{10}{100}$ (or $\frac{1}{10}$) of a dollar = .10 (or .1) of a dollar.

   25¢ = $\frac{25}{100}$ of a dollar = .25 of a dollar.

   50¢ = $\frac{50}{100}$ (or $\frac{5}{10}$) of a dollar = .50 (or .5) of a dollar.
7. Numbers when written with the decimal point are read exactly as when written as fractions.

   $\frac{1}{100}$ of a dollar is read *one-hundredth* of a dollar.

   .01 of a dollar is read *one-hundredth* of a dollar.

   $\frac{1}{10}$ of a dollar is read *one-tenth* of a dollar.

   .1 of a dollar is read *one-tenth* of a dollar.

   $\frac{25}{100}$ of a dollar is read *twenty-five-hundredths* of a dollar.

   .25 of a dollar is read *twenty-five-hundredths* of a dollar.

   $\frac{5}{10}$ of a dollar is read *five-tenths* of a dollar.

   .5 of a dollar is read *five-tenths* of a dollar.
8. From this it is seen that the first figure following the decimal point is read as *tenths;* the second figure as *hundredths.*

1. Read the following numbers as parts of a dollar:

.05	.45	.23	.3
.6	.93	.8	.44
.18	.06	.75	.02
.72	.15	.9	.12

2. Write each of the above decimal fractions in the form of common fractions.

3. Express the following common fractions in the form of decimal fractions:

$\frac{3}{100}$ bu. $\frac{7}{10}$ ft. $\frac{6}{10}$ hr.

$\frac{4}{10}$ gal. $\frac{25}{100}$ ton. $\$\frac{37}{100}$.

4. Write as decimal fractions the following:

$\frac{94}{100}$	$\frac{4}{10}$	$\frac{15}{100}$	$\frac{6}{100}$
$\frac{7}{10}$	$\frac{86}{100}$	$\frac{9}{100}$	$\frac{6}{10}$
$\frac{18}{100}$	$\frac{19}{100}$	$\frac{9}{10}$	$\frac{2}{100}$
$\frac{6}{10}$	$\frac{5}{10}$	$\frac{12}{100}$	$\frac{2}{10}$

5. A boy spent .25 of a dollar; how many cents did he spend?

.01 of a dollar $= 1¢$.

.25 of a dollar $= 25 \times 1¢ = 25¢$.

6. From a flock of 350 sheep a farmer sold .3 of them. How many did he sell?

7. A piece of cloth 10 yd. long was sold to two customers, one buying .5 of it, the other buying the rest. How many yards did each one take?

8. A boy traveled 100 miles, going .2 of the way by boat. How many miles did he go by boat?

9. From a cistern holding 500 gal., .07 of its contents were drawn off. How many gallons were drawn off?

10. A man bought .75 of a quantity of grain measuring 400 bu. How many bu. did he buy?

1. Begin on the right and add as with whole numbers.

12.24	Place the decimal point (.) in the sum just
16.32	beneath the points in the addends (numbers to
8.12	be added).
9.67	
3.25	

2. Add:

(1)	(2)	(3)	(4)
623.21	4561.38	685.329	365.250
68.75	28.17	27.602	.168
90.66	191.76	7.001	90.027
8.32	9.68	.868	106.995
4.00	3125.88	12.789	78.200
67.75	.98	1.896	9.375

3. Begin on the right and subtract as with whole numbers and place the point beneath the points in the subtrahend and minuend.

(1) 86.3	(2) 60.9	(3) 35.16	(4) 30.16
7.9	14.7	21.87	3.95
(5) 201.06	(6) 476.001	(7) 108.08	(8) 806.302
99.98	96.993	69.89	99.809
(9) 36.004	(10) 1008.90	(11) 101.010	(12) 600.006
9.735	86.96	90.909	589.099

4. Divide 25 by 10 and express the quotient in decimal form.

$10\overline{)25}$ or $10\overline{)25}$

$2\frac{5}{10}=2.5$ 2.5

5. Divide 256 by 100 and give the quotient in decimal form.

$100\overline{)256}$ or $100\overline{)256}$

$2\frac{56}{100}=2.56$ 2.56

6. Multiply 2.5 by 10; multiply 2.56 by 10; by 100.
7. What part of 35 is 3.5? .35?

1. How many times 3.5 is 35? What part of 3.5 is .35?
2. What part of 325 is 32.5? 3.25? .325?
3. How many times .325 is 3.25? 325?
4. How may you quickly divide a number by 10 by merely changing the decimal point? by 100? by 1000?
5. How may you quickly multiply a number by 10? by 100? by 1000?
6. Multiply 68 by 27; by 2.7; by .27.

(*a*)	(*b*)	(*c*)
68	68	68
27	2.7	.27
476	476	476
136	136	136
1836	183.6	18.36

$10 \times 2.7 = ?$ $100 \times .27$.
What part of 27 is 2.7? .27?
What part of 68×27 is 68×2.7? $68 \times .27$?
In (*b*) how many decimal figures are in the product? in (*c*)?

7. Multiply 6.8 by 27; by 2.7; by .27.

(*a*)	(*b*)	(*c*)
6.8	6.8	6.8
27	2.7	.27
476	476	476
136	136	136
183.6	18.36	1.836

What part of 68×27 is 6.8×27? 6.8×2.7? $6.8 \times .27$?
How many decimal places in (*a*)? in (*b*)? in (*c*)?
How many decimal places in both the multiplicand and multiplier?
How may one quickly tell by looking at multiplicand and multiplier how many decimal places the product must have?

8. Knowing that $1235 \times 321 = 396435$, give the answers to all these questions without multiplying:
   (1) $1235 \times 32.1 = ?$
   (2) $1235 \times 3.21 = ?$
   (3) $123.5 \times 32.1 = ?$
   (4) $12.35 \times 3.21 = ?$
   (5) $1.235 \times 321 = ?$
   (6) $12.35 \times .321 = ?$
   (7) $1.235 \times 3.21 = ?$
   (8) $1.235 \times .321 = ?$

1. Solve the exercises:

(1) $32 \times 2.5 = ?$
(2) $45 \times 3.8 = ?$
(3) $63 \times .28 = ?$
(4) $3.9 \times 4.5 = ?$
(5) $8.5 \times .48 = ?$
(6) $5.8 \times .75 = ?$
(7) $28.6 \times 32.5 = ?$
(8) $2.86 \times 3.56 = ?$
(9) $28.6 \times 3.56 = ?$
(10) $6.85 \times 41.6 = ?$
(11) $6.85 \times 4.61 = ?$
(12) $6.85 \times .475 = ?$

2. Divide 894.24 by 24.3.

36.8, *Quotient*
Divisor, 24.3)894.24, *Dividend*
729.
165.2
145.8
19.44
19.44
0 *Remainder.*

As with whole numbers, we say 24 in 89, **3** times. Write 3 above 9. $24.3 \times 30 = 729$. $894 - 729 = 165$. Bring down the 2 of the dividend, giving 165.2. Then 24 in 165, **6** times. Write 6 in the quotient, and so on. Keep the decimal points in a vertical line.

2. Solve the following exercises:

(1) $86.4 \div 24$;
(2) $64.8 \div 36$;
(3) $249.1 \div 53$;
(4) $327.6 \div 63$;
(5) $251.6 \div 74$;
(6) $104.8 \div 3.6$;
(7) $140.4 \div 5.4$;
(8) $148.8 \div 6.2$;
(9) $167.5 \div 4.8$;
(10) $425.6 \div 7.6$;
(11) $101.34 \div 3.6$;
(12) $215.536 \div 7.8$;
(13) $13.312 \div 4.16$;
(14) $83.781 \div 2.61$;
(15) $246.015 \div 3.15$;
(16) $396.435 \div 32.1$;
(17) $4418.904 \div 36.28$;
(18) $843.505 \div 6.83$;
(19) $850.335 \div 12.45$;
(20) $449.35 \div 18.92$.

1. In one dollar how many cents?
2. What part of one dollar is 1 cent? 12 cents? 23 cents?
3. Another term for hundredths is *per cent.*
   15 hundredths of a dollar = 15 per cent of a dollar.
   7 hundredths of a dollar = 7 per cent of a dollar.
4. Instead of the word per cent, the sign % is often used.
   15% of a dollar = 15 per cent, or hundredths, of a dollar.
   7% of a dollar = 7 per cent, or hundredths, of a dollar.
5. Since anything may be divided into 100 equal parts, any number of such parts may be called so many hundredths or per cent.
   $\frac{15}{100}$ of a bu. = 15% of a bu.
   $\frac{7}{100}$ of a bu. = 7% of a bu.
6. Since 15% is the same as $\frac{15}{100}$, it may be written as a decimal fraction exactly as $\frac{15}{100}$ may be written decimally, .15; 7%, the same as $\frac{7}{100}$ may be written .07.
7. Write first with per cent sign, then as decimal fractions:

$\frac{8}{100}$	$\frac{6}{100}$	$\frac{13}{100}$	$\frac{33}{100}$
$\frac{40}{100}$	$\frac{18}{100}$	$\frac{14}{100}$	$\frac{12}{100}$
$\frac{25}{100}$	$\frac{20}{100}$	$\frac{50}{100}$	$\frac{16}{100}$
$\frac{75}{100}$	$\frac{60}{100}$	$\frac{45}{100}$	$\frac{66}{100}$

8. Write first as common, and then as decimal fractions:

10%	25%	64%	$12\frac{1}{2}$%
15%	20%	53%	$33\frac{1}{3}$%
3%	50%	2%	$16\frac{2}{3}$%
5%	75%	45%	$66\frac{2}{3}$%

9. Write as common fractions:

.8	.25	.7	.09
.5	.14	.04	.85
.16	.75	.65	.01
.33	3.1	2.25	1.03

1. Review pages 178 and 218.
2. How many cents in $\frac{1}{4}$ of a dollar? In $\frac{1}{2}$ of a dollar? $\frac{3}{4}$ of a dollar? $\frac{1}{8}$ of a dollar? $\frac{5}{8}$ of a dollar? $\frac{7}{8}$ of a dollar?
3. What per cent of a dollar is $\frac{1}{4}$ of a dollar? $\frac{3}{4}$? $\frac{1}{2}$? $\frac{1}{8}$? $\frac{5}{8}$? $\frac{3}{8}$? $\frac{7}{8}$?
4. Instead of one dollar, find the same parts and per cents of one gallon. One bushel. Of any unit. Of \$8. Of \$24. Of 40 marbles. Of 84 acres.
5. 25% of any number is what fractional part of it?
6. Answer similar questions regarding the other per cents used.
7. How many cents is $\frac{1}{6}$ of a dollar? $\frac{5}{6}$ of a dollar? $\frac{1}{3}$ of a dollar? $\frac{2}{3}$ of a dollar?
8. What per cent of a dollar is $\frac{1}{6}$ of a dollar? $\frac{5}{6}$ of a dollar?
9. Instead of one dollar, find $\frac{1}{6}$ and $\frac{5}{6}$ of one yard. Of one foot.
10. What per cent of a foot is $\frac{1}{6}$ of a foot? $\frac{5}{6}$ of a foot? $\frac{1}{3}$ of a foot? $\frac{2}{3}$ of a foot?
11. What per cent of a yard is $\frac{1}{6}$ of a yard? $\frac{5}{6}$ of a yard? $\frac{1}{3}$ of a yard? $\frac{2}{3}$ of a yard?
12. Find $16\frac{2}{3}\%$ of 18 pigeons. Of 24 marbles. Of 30 boys. Find $83\frac{1}{3}\%$ of the same. $33\frac{1}{3}\%$. $66\frac{2}{3}\%$.
13. $33\frac{1}{3}\%$ of 12 is ? $\frac{1}{4}$ of 12 is ? $33\frac{1}{3}\%$ of 12 and $\frac{1}{3}$ of 12 are the same.
14. Make statements about the other per cents.
15. 50% of Fred's money is 15 cents. How much money has he?
16. 75% of the milk one family uses in a week is 9 quarts. How much milk is used? What part of the quantity used is 9 qts.?
17. $33\frac{1}{3}\%$ of the horses in a livery stable is 21. How many horses in all? What part of the whole number of horses is 21 horses?

1. A man set out 150 fruit-trees and 28% of them died. How many died?

150	The *base* is the number on which the percentage
.28	is to be found.
1200	The *rate* is the per cent to be found. It may be
300	written as a decimal.
42.00	The *percentage* is a certain number of hundredths
	of the base. Here it is .28.

To find the percentage:

2. Solve the following exercises:

(1) 12% of 35=? (6) 36% of 80=? (12) 95% of 1200=?
(2) 18% of 65=? (7) 38% of 75=? (13) 85% of 1000=?
(3) 30% of 68=? (8) 43% of 60=? (14) 85% of 150=?
(4) 45% of 90=? (9) 65% of 350=? (15) 25½% of 600=?
(5) 24% of 45=? (10) 70% of 460=? (16) 37½% of 800=?
(11) 75% of 650=?

To find the rate:

3. The base is 320 and the percentage is 48. Find the *rate.*

.15, *rate*	
base, 320)48.00, *percentage*	Divide the percentage by the
320	base.
1600	
1600	

4. Find the rate in the following exercises:

(1) base = 240, percentage = 72;
(2) base = 120, percentage = 6;
(3) base = 65, percentage = 13;
(4) base = 96, percentage = 24;
(5) base = 104, percentage = 26;
(6) base = 144, percentage = 48;
(7) base = 160, percentage = 80;
(8) base = 80, percentage = 10.

To find the base:

1. The percentage is 87 and the rate is 25; find the base.

$$\begin{array}{r} 348,\ \textit{base} \\ \textit{rate, } .25\overline{)87.00,\ \textit{percentage}} \\ 75 \\ \hline 120 \\ 100 \\ \hline 200 \\ 200 \\ \hline \end{array}$$

Divide the percentage by the rate per cent expressed as a decimal.

2. Find the base in the following exercises:

(1) percentage = 96, rate = 12; (8) percentage = 44.8, rate = 7;
(2) percentage = 75, rate = 15; (9) percentage = 10.88, rate = 17;
(3) percentage = 15, rate = 3; (10) percentage = 32.2, rate = 35;
(4) percentage = 37, rate = 10; (11) percentage = 92.4, rate = 24;
(5) percentage = 48, rate = 6; (12) percentage = 97.2, rate = 45;
(6) percentage = 42, rate = 14; (13) percentage = 12.8, rate = 8;
(7) percentage = 54, rate = 18; (14) percentage = 291.84, rate = 32.

3. Find the amounts in each exercise of problem 4, p. 267.
4. $16\frac{2}{3}\%$ of my pens are 42. 42 pens is what part of the whole number? How many pens have I?
5. A boy lost $16\frac{2}{3}\%$ of his marbles, and had 30 marbles left. What part was lost? How many were lost? How many had he at first?
6. In an orchard of 156 trees, $16\frac{2}{3}\%$ are pear, and $83\frac{1}{3}\%$ are apple. What part of the whole number of trees is pear? Apple? How many of each?
7. A man bought a bicycle for \$45 and sold it so as to gain 25%. What was the selling price?
8. $87\frac{1}{2}\%$ of the butter in a dairy is 84 pounds. What is the whole number of pounds? If sold at 23 cents per pound, how many dollars will the dairyman receive?

1. Charles loaned William one dollar, charging him 6 cents for using it one year. At the same price, how much would William pay for using $2 for one year? $5? $25?
2. Charles put $1 in the bank for one year and the banker paid him 6 cents (or 6%) for the use of it. At the end of the year Charles told the banker he could use $1 for 6 months longer at the same price (or rate) for using it. How much did the banker pay Charles for the use of $1 for 6 months? For one year and six months?
3. The charge or price paid for the use of money is interest.
4. At 6 cents (or 6%) interest on one dollar, how much will it cost Mr. Andrews to borrow $35 for one year?
5. At 6%, how much interest will Mary have to pay a bank for using $75 of its money for one year?
6. 6% (or 6 cents) on each dollar is a common price or rate of interest to pay for the use of a dollar for one year. This makes 6% interest on $1 how much for 6 months? For 3 months?
7. Clara borrowed $15 from her brother for 6 months at 6%. How much did she pay for the use of the money?
8. Mr. Tanner borrowed $95 for 4 months at 6%. How much interest did he pay?
9. Allen's father loaned him $50 for one year and six months at 6%. How much did his father receive for the use of the money?
10. John loaned his sister $17 for one year and three months at 6%. How much interest did she pay him at the end of that time?
11. A grocer borrowed $200 for 3 years and 6 months at 6% interest. What did the use of the money cost him?
12. A father loaned each of his two sons $125.00 for 5 years and three months at 6%. How much did the father receive for the use of the money?

1. At 6%, what is the interest on $245 for one year? For 6 months? For 3 months? For one year and 6 months? For one year and 3 months? For one year and 9 months?
2. William's uncle loaned him $25 for one year at 6%. How much interest did William pay at the end of the year? How much did he pay to rid himself of the whole debt?
3. Henry loaned John $125 for 5 years and 6 months at 6%. At the end of that time how much money did John pay Henry?
4. Annette borrowed $220 from her mother for 7 years and 3 months at 6%. What was the whole sum of her debt at the end of that time?
5. A janitor borrowed $321 from his employer for $3\frac{1}{2}$ years at 6%. What was the whole sum (or amount) of his debt at the end of that time?
6. What is the interest on $25 for one year? What is the amount due at the end of that time?
7. What is the interest and the amount on $5 for 7 years and 3 months?
8. How much money must John lend at 6% to earn 6 cents in one year?
9. How much money must Clara lend at 6% to earn 60 cents in one year?
10. What sum of money must Kate lend to Mary at 6% to earn 90 cents in one year?
11. What sum can Amos loan his father at 6% to earn $1.50 in one year?
12. The sum of money upon which the interest is found is the principal.
13. What is the principal which Mary must lend at 6% so that she may gain 30 cents in one year?
14. What principal at 6% will bring $7.20 in one year?

1. What principal at 6% will bring \$1.80 in one year?
2. What would the same principal at the same interest gain in 6 months? In 3 months?
3. What principal must John loan to Will at 6% to gain \$1.35 in 6 months?
4. What principal must Charles loan the bank at 6% if he receive for his money \$1.95 in 3 months?
5. How long will it take \$1 at 6% to earn 6 cents?
6. At 6%, how long will it take \$5 to earn 60 cents?
7. How long must Kate lend John \$75 at 6% to have it gain \$22.50?
8. Samuel borrowed \$40 at 6%. In how long a time would he have to pay \$16.80 for interest?
9. Henry borrowed \$2400 at 6% for 3 years and 6 months. What was the interest?
10. What was the principal of Henry's debt? What was the interest? What was the amount? What was the time? What was the rate?
11. Elizabeth borrowed \$50 at 6% for 4 years and 3 months, what was the interest?
12. What was the principal of Elizabeth's debt? What was the interest? The amount? The time? The rate?
13. Find the interest, the amount and the rate on \$2000 borrowed for 5 years and 6 months at 6%.
14. Name the interest and the amount in the following cases at 6%:
    (*a*) \$255 borrowed for 4 years and 9 months.
    (*b*) \$275 borrowed for 5 years and 2 months.
    (*c*) \$821 borrowed for 6 years and 3 months.
    (*d*) \$445 borrowed for 10 years and 6 months.
    (*e*) \$4450 borrowed for 5 years and 6 months.
    (*f*) \$7725 borrowed for 20 years and 3 months.
    (*g*) \$8726 borrowed for 9 years and 2 months.

To find the interest and the amount:

1. Examine problem 14, p. 271, and make a rule for finding the *interest*, when the principal, rate, and time, in years, are given.
2. Make a rule for finding the *amount*.
3. Find the interest and amount in the following problems:
   (*a*) principal = \$450, rate = 4%, and time = $3\frac{1}{3}$ years;
   (*b*) principal = \$236, rate = 6%, and time = $2\frac{3}{4}$ years;
   (*c*) principal = \$175, rate = 7%, and time = $1\frac{2}{3}$ years;
   (*d*) principal = \$1260, rate = 8%, and time = $3\frac{5}{12}$ years;
   (*e*) principal = \$1080, rate = 5%, and time = $\frac{7}{12}$ year.

To find the principal:

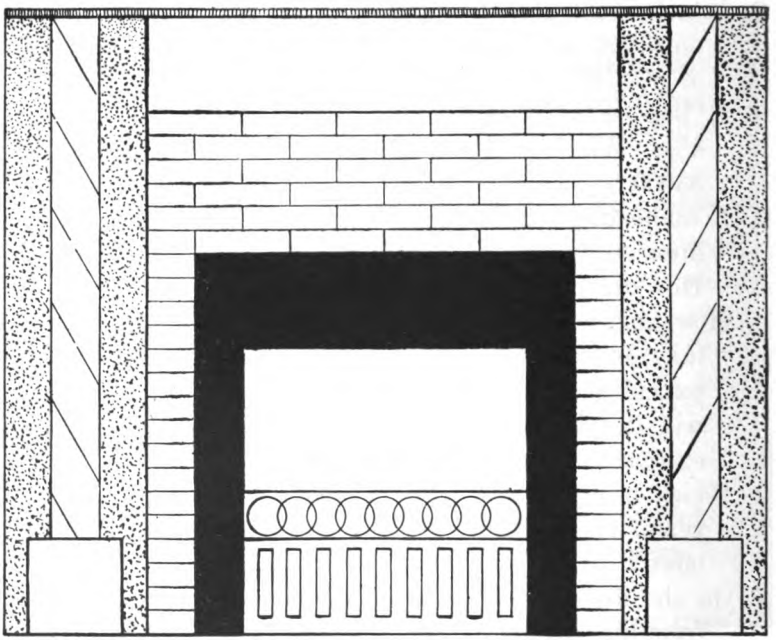
INTEREST.

In Interest problems the base is called the *principal*, the rate is called *rate of interest*, or *rate*, and the percentage is called *interest for one year*.

To find the interest for a longer or shorter time than 1 year the interest for 1 year is multiplied by the time expressed in *years*.

4. Morgan lent Henry \$55.00 for a year at 6% interest. At the end of the year how much interest did Henry owe Morgan? What was the whole amount that Henry owed Morgan at the end of the year?
5. Find the interest and amount of \$180.00 at 8% for $2\frac{1}{2}$ years?
6. A man owed \$875.00 for 3 yr. and 6 mon. on which he paid 5% interest. What was whole amount of his debt at the end of this time?
7. I borrowed \$2400.00 for 4 yr. 9 mon. at $6\frac{1}{2}$%. What was the interest and what the amount I owed at the end of the time?

8. Which is the greater and how much greater, the interest on \$1250 at $6\frac{1}{2}\%$ for $4\frac{1}{2}$ years, or the interest on \$1800 at 5% for 4 years and 9 months?
9. A boy earns \$3.00 a week and \$3900.00 are lent at 4%. Which brings in the more money, the boy or the \$3900?
10. A man earns $\$83\frac{1}{3}$ a month and \$20,000 are lent at $4\frac{1}{2}\%$ interest. Which produces the larger income in a year? How much larger?
11. How many \$1200 sums of money lent at 7% will it take to bring in enough to support a family whose expenses are \$42 a month? How many such sums will it take if they are lent at 5% and the family's expenses are \$50 a month?
12. Which brings in the more interest, \$750 at $7\frac{1}{2}\%$ in $2\frac{1}{4}$ years, or \$1350 at $4\frac{1}{2}\%$ in $2\frac{1}{12}$ years? How much more?
13. On the first day of January a boy lends his father \$20 from his savings the year before. On the first of the next January he lends his father another \$20. He continues this for five years. His father pays him 12% on each sum after he has had it a year. How much interest does the boy receive at the end of the 1st year? Of the 2nd year? Of the 3rd year? Of the 4th year? Of the 5th year? In all 5 years?
14. The father pays the boy all the money he has borrowed at the end of the 5th year. If the boy has saved all his interest how much money has he now from all the \$20 loans and interest?
15. A man's tax amounted to \$175.85. He failed to pay it for 5 years. He was charged 6% interest for each year he failed to pay. What was the whole amount he had to pay?



Without measuring, make a list of the following estimates in the drawing.

1. Height of whole mantel. Width of whole mantel.
2. Shelf to top of tiling.
3. Top of tiling to top of grate iron.
4. Width of upper part of grate iron.
5. Width of open space from grate iron to grill.
6. Width of upper grill; of lower grill.
7. Width of whole mantel.
8. Width of board behind each pillar.
9. Width of each pillar.
10. Width of tiled space at each side of grate iron.
11. Width of side iron of grate.
12. Measure all these distances and compare the measurements with your estimates.

The drawing on the opposite page is made to the scale of $\frac{1}{4}$ in. to 1 foot.

Add to the list of measurements of the drawing on the opposite page, the measurements of the mantel according to the scale.

1. What is the area of the board below the shelf? The board back of each pillar? The tiling above the grate? At each side of the grate? Both grills? The iron around the grate?
2. Find the diameter of each post.
3. If the grate is 12 in. deep, how many cu. ft. are there in the open space of the grate?
4. At \$.60 a sq. ft., what was the cost of tiling this mantel?
5. The price of this mantel was \$75, but the merchant gave the purchaser a discount of 2%. What did the mantel really cost?
6. The grate has 8 rows of gas pipe in it, each row containing 10 sets of holes, 5 rows in a set. How many gas jets are there in the mantel?
7. Each row of gas pipe in the grate reaches from side to side of the entire open space. How many feet of pipe are in the grate?
8. The mantel occupies 10% of the wall it is in. How many square feet are in the wall?
9. A tiled hearth occupies the entire space in front of the mantel and is 2 feet wide. What was the cost of tiling at 35¢ a square foot?
10. From catalogues obtain prices of tiling, grill work, woodwork, etc., and make problems similar to those on this page.

MULTIPLICATION TABLES.

1× 1= 1	2× 1= 2	3× 1= 3	4× 1= 4
1× 2= 2	2× 2= 4	3× 2= 6	4× 2= 8
1× 3= 3	2× 3= 6	3× 3= 9	4× 3=12
1× 4= 4	2× 4= 8	3× 4=12	4× 4=16
1× 5= 5	2× 5=10	3× 5=15	4× 5=20
1× 6= 6	2× 6=12	3× 6=18	4× 6=24
1× 7= 7	2× 7=14	3× 7=21	4× 7=28
1× 8= 8	2× 8=16	3× 8=24	4× 8=32
1× 9= 9	2× 9=18	3× 9=27	4× 9=36
1×10=10	2×10=20	3×10=30	4×10=40
1×11=11	2×11=22	3×11=33	4×11=44
1×12=12	2×12=24	3×12=36	4×12=48
5× 1= 5	6× 1= 6	7× 1= 7	8× 1= 8
5× 2=10	6× 2=12	7× 2=14	8× 2=16
5× 3=15	6× 3=18	7× 3=21	8× 3=24
5× 4=20	6× 4=24	7× 4=28	8× 4=32
5× 5=25	6× 5=30	7× 5=35	8× 5=40
5× 6=30	6× 6=36	7× 6=42	8× 6=48
5× 7=35	6× 7=42	7× 7=49	8× 7=56
5× 8=40	6× 8=48	7× 8=56	8× 8=64
5× 9=45	6× 9=54	7× 9=63	8× 9=72
5×10=50	6×10=60	7×10=70	8×10=80
5×11=55	6×11=66	7×11=77	8×11=88
5×12=60	6×12=72	7×12=84	8×12=96
9× 1= 9	10× 1= 10	11× 1= 11	12× 1= 12
9× 2= 18	10× 2= 20	11× 2= 22	12× 2= 24
9× 3= 27	10× 3= 30	11× 3= 33	12× 3= 36
9× 4= 36	10× 4= 40	11× 4= 44	12× 4= 48
9× 5= 45	10× 5= 50	11× 5= 55	12× 5= 60
9× 6= 54	10× 6= 60	11× 6= 66	12× 6= 72
9× 7= 63	10× 7= 70	11× 7= 77	12× 7= 84
9× 8= 72	10× 8= 80	11× 8= 88	12× 8= 96
9× 9= 81	10× 9= 90	11× 9= 99	12× 9=108
9×10= 90	10×10=100	11×10=110	12×10=120
9×11= 99	10×11=110	11×11=121	12×11=132
9×12=108	10×12=120	11×12=132	12×12=144

LIQUID MEASURE

4 gills (gi.)	= 1 pint	(pt.).
2 pints	= 1 quart	(qt.).
4 quarts	= 1 gallon	(gal.).
1 gallon	= 231 cubic inches.	
31½ gallons	= 1 barrel	(bbl.).

DRY MEASURE

2 pints (pt.)	= 1 quart	(qt.).
8 quarts	= 1 peck	(pk.).
4 pecks	= 1 bushel	(bush.
1 bushel	= 2150.42 cubic inches.	

AVOIRDUPOIS WEIGHT

16 ounces (oz.)	= 1 pound	(lb.).
2000 pounds	= 1 ton	(T.).

LINEAR MEASURE

12 inches (in.)	= 1 foot	(ft.).	5½ yards, or 16½ feet = 1 rod (rd.).
3 feet	= 1 yard	(yd.).	320 rods, or 5280 feet = 1 mile (m.).

SQUARE MEASURE

144 square inches (sq. in.)	= 1 square foot	(sq. ft.).
9 square feet	= 1 square yard	(sq. yd.).
30¼ square yards, or 272¼ square feet	= 1 square rod	(sq. rd.).
160 square rods	= 1 acre	(a.).
640 acres	= 1 square mile	(sq. m.).

SOLID OR CUBIC MEASURE

1728 cubic inches (cu. in.)	= 1 cubic foot	(cu. ft.).
27 cubic feet	= 1 cubic yard	(cu. yd.).

WOOD MEASURE

16 cubic feet	= 1 cord foot	(cd. ft.).
8 cord feet, or 128 cubic feet	= 1 cord	(cd.).

TIME MEASURE

60 seconds (sec.)	= 1 minute	(m.).
60 minutes	= 1 hour	(h.).
24 hours	= 1 day	(d.).
7 days	= 1 week	(wk.).
365 days	= 1 common year	(c. yr.).
366 days	= 1 leap year	(l. yr.).
100 years	= 1 century	(C.).

MISCELLANEOUS TABLES

12 units	= 1 dozen.
12 dozen	= 1 gross.
20 units	= 1 score.
24 sheets	= 1 quire.
20 quires	= 1 ream.